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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW

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OF THE

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ANNUAL EXHIBITION
OF FOUNDRY AND MACHINE
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AT

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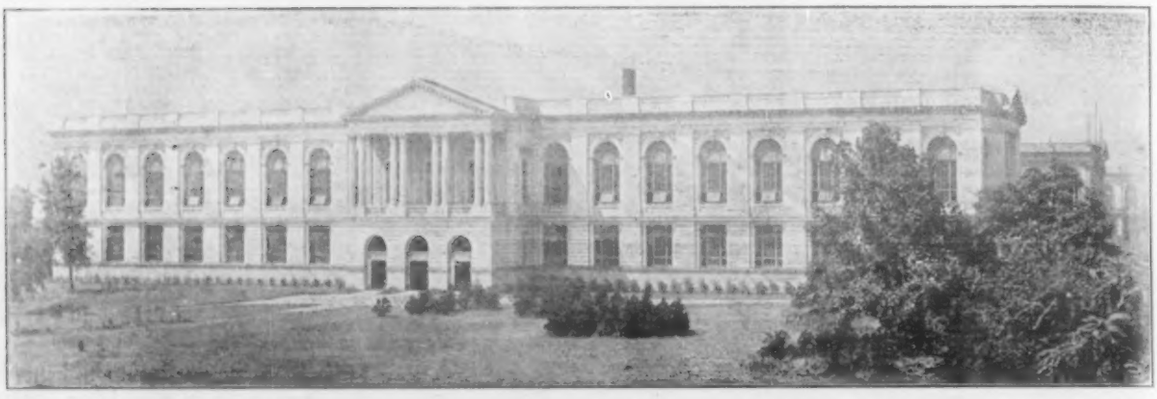

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Vol. 17 NEW YORK, JULY, 1919 No. 7

AMERICAN ELECTRO-PLATERS' SOCIETY

SEVENTH ANNUAL CONVENTION HELD AT BELLEVUE-STRATFORD HOTEL, PHILADELPHIA, PA., JULY 1, 2 AND 3, 1919.

BY L. J. KROM.

The "green" and " red" rooms on the second floor of the Bellevue-Stratford in Philadelphia, Pa., during the first three days of July witnessed the greatest assemblage of persons interested in the art of finishing of metals ever gathered together. The American Electro-Platers' Society held on these days its seventh annual convention and at the same time celebrated its tenth birthday. The proceedings staged at the hotel revealed that the Society had made an enviable record for the ten years of its existance and proved the truth of the adage that "In union there is strength." Some two hundred and fifty delegates from 17 branch societies representing a membership of 824 gathered in convention and from their deliberations it is plainly seen that the society is on a firm and lasting basis.

OSCAR E. SERVIS,
Chicago Branch, President.

JOHN E. STERLING,
New York Branch, Secretary-Treas.

H. H. WILLIAMS,
St. Louis Branch, Editor.

NEW OFFICERS OF THE AMERICAN ELECTRO-PLATERS' SOCIETY FOR 1919-20.

THE FIRST DAY, JULY 1.

The convention opened on the morning of the first of July with Supreme President Walter Fraine presiding. The address of welcome and the extending of the keys and the freedom of the City of Philadelphia to the platers and their friends was made by Edward J. Cattell, City Statistician, in the absence of the Mayor, Hon. Thomas B. Smith. Mr. Cattell is a wizard in figures and performed the remarkable feat of delivering a speech which, while full of otherwise dry statistics, was so interlarded with wit and humor that he kept the audience in an uproar. Mr. Cattell's message to the platers was to the effect that there never was better opportunities at hand time. The speech of acceptance of the Keys and Freedom of the City was made by S. D. Benoliel of the Philadelphia Branch, who made an interesting and forceful address. President O. W. Mott of the Philadelphia Branch welcomed the platers to the city and told of the progress made by his branch. He assured the visiting platers that the Philadelphia Branch was in complete accordance with the efforts of her sister branches to make the Society successful and to become a recognized authority on the subject of the finishing of metals.

Mr. Mott was followed by Dr. Edgar Fahs Smith provost and professor of chemistry at the University of Philadelphia. Dr. Smith, in a most interesting address, delivered a lesson with a punch to it. He virtually made a plea for the establishing of courses in electro-plating in trade schools throughout the country where young men and older men who wanted to know the "why" of their work could be taught. He showed how the platers were moving in the dark and pointed the way to the light. He related how in 1882 he performed an experiment in the hopes of producing a certain compound. He said he took a platinum dish, put in some salicylic acid, added a few drops of methyl alcohol and sulphuric acid and then filled up the dish with water. He then placed the

dish and its contents on a copper ring connected with one end of an electric circuit. He dipped a platinum rod connected with the other end of the circuit into the solution. In a few moments he had made methyl salicylate or oil of wintergreen. He was delighted with his work and told his friends what he had done. They attempted to perform the experiment but failed to produce any oil of wintergreen. He then tried to repeat it himself and failed. He discovered that in his original experiment he had neglected to record just How MUCH of everything he had used. He afterwards had to study out what was required from this little story he preached a sermon to the platers on the importance of knowing exactly what they were doing all the time so that they could intelligently carry on their work. Dr. Smith's address made a great impression on his audience and from all sides were heard remarks of appreciation and expression of determination to follow the Doctor's advice.

After the introduction and identification of the members and delegates, Charles H. Proctor, the Father of the American Electro-Platers' Society, read an address on "How We CAN BEST ADOPT STANDARDIZATION FOR PLATERS' SOLUTIONS IN INDIVIDUAL PLANTS." This address is published in full in this issue of THE METAL INDUSTRY.

EVENING

At the evening session the subject of standardization was taken up and Louis Schulte read a paper that treated of a proposed method for arriving at standard solutions. Mr. Schulte suggested that each of the metals be taken up in turn and that platers in all branches work out rewhat they were represented to be. He demanded that the average results be adopted or recommended as standard. The paper brought out some spirited discussion.

George B. Hogaboom started the ball and in an impassioned speech declared that no standardization of solutions should be attempted until the plater could be assured of pure chemicals and that these chemicals were what they were represented to be. H demanded that the manufacturers furnish the plater with honest supplies and that platers should insist that purchasing agents should get the plater what he wanted. Mr. Gehling of the Philadelphia Branch stated that he was in favor of standardization and declared he believed it could be done and said that he never had any trouble in getting his purchasing agent to buy materials that he specified. Other speakers on the subject were delegates Sperry, Matthews, Eichstaedt and Hazuch. Dr. Blum closed the discussion and stated that the Bureau was willing and anxious to co-operate in the work of the society.

A paper on "How TO MAINTAIN A BRASS SOLUTION FROM A STOCK SOLUTION" was read by C. M. Moore of the American Chain Company at York, Pa., and elicited some lively discussion and brought out some valuable information about the maintenance of brass solutions.

J. C. Miller of the Grand Rapids Branch described the use of the double-throw switch for the cleaning of metals as used in Grand Rapids at the plant of the Wolverine Brass Works. This brought out the information from some of the members that the double-throw switch had been in use for some ten years and was considered a valuable adjunct in the plating room.

E. W. Heil of Wichita, Kansas, then described an ampere meter which he had devised which would indicate the amount of current that was flowing at any particular part of a tank.

THE SECOND DAY, JULY 2.

The greater part of this session was taken up with the reading of the minutes of the 1918 Convention held in Detroit, the reports of the president, secretary and treasurer. These reports were accepted and ordered filed as read and will be published in the Monthly Review.

Henry Posbeck, president of the Chicago Branch, then delivered an eulogistic address concerning Miss E. Zalia Jencks, an electro-chemist of Chicago, attached to the Bureau of Standards at Washington, D. C. Mr. Posbeck announced that Miss Jencks had been elected an honorary member of the Chicago Branch. He then in a formal address presented Miss Jencks with the membership and an enormous bunch of American Beauty roses. Miss Jencks was then nominated and unanimously elected an honorary member of the American Electro-Platers' Society. "Daddy" Hale then announced that he and "his boys" of the Cleveland Branch were happy to receive her as a "daughter" of the Society.

Miss Jencks in a few words thanked the members for the honor conferred upon her and told a little story that was illustrative of her position. She said "This is overwhelming, perhaps you have heard the story of the baby that was very ill. A doctor was called to attend it. After closely examining the infant the medical man straightened up and gravely informed the mother that the child was doomed." "What!" cried the mother, "can nothing be done to save my child!" Before the doctor could even nod his head, the child opened its eyes and said 'Absolutely nothing'!"

At this time Dr. Blum of the Bureau of Standards announced that he had a message to deliver. He stated that the Bureau was very desirous to continue the work regarding electro-plating that it had been doing, but Congress had appropriated only $10,000 for the coming year. He said it would take about $30,000 to carry on the work properly. He suggested that some action be taken to put the matter before manufacturers and others interested in electro-plating with a view to get them to subscribe a fund. He thought that some twenty firms could be found to donate say $100 a year for the next three years. Considerable enthusiasm was shown by the delegates and some went so far as to pledge their branches and firms. The discussion was brought to a close by a motion being made for a committee to be appointed to take up the matter and devise a method of procedure. This motion was seconded and President Fraine said he would appoint the committee later.

This committee was made up as follows:

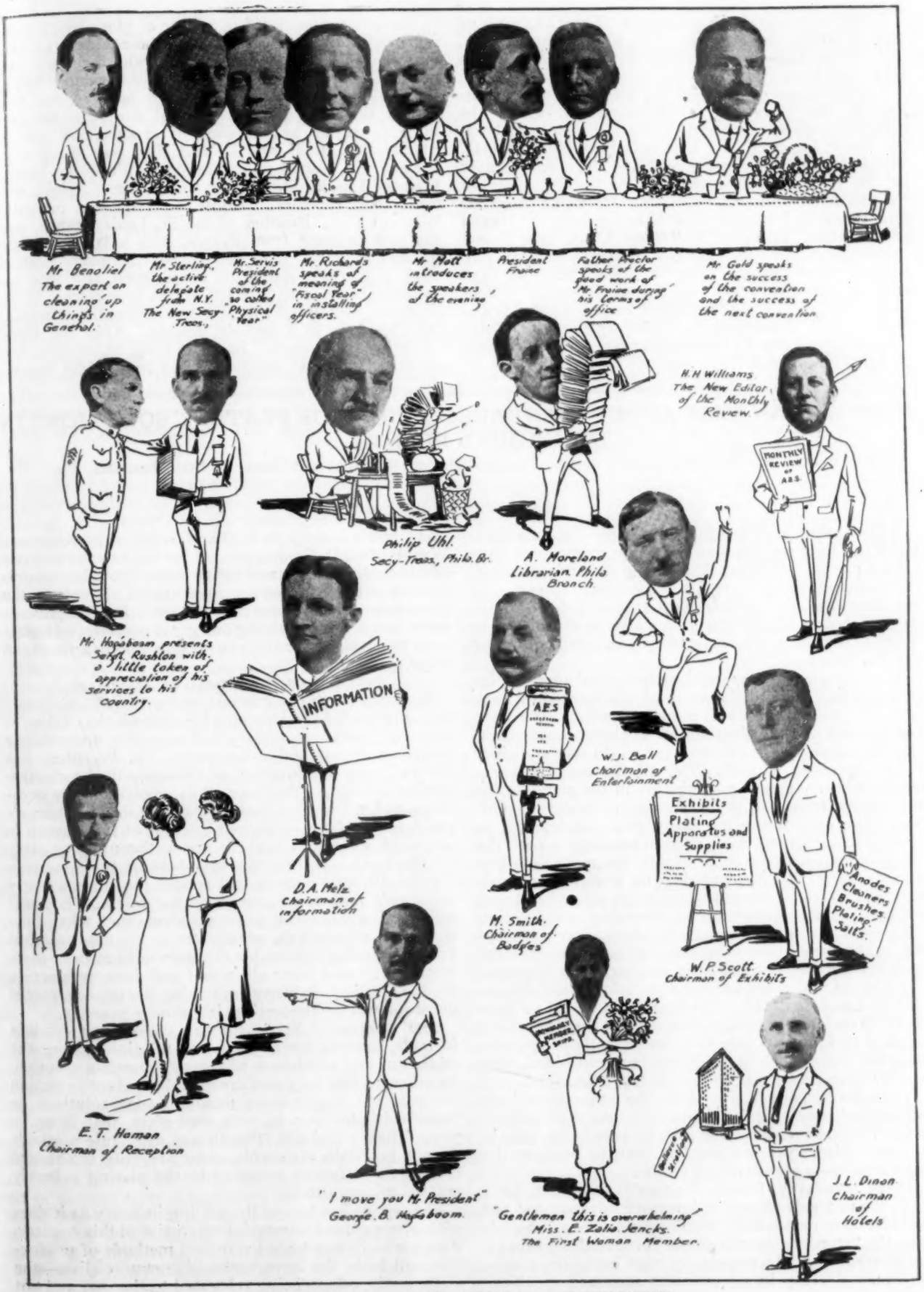
Research, Messrs Walter Fraine, John W. Slattery and John E. Sterling; Publicity, Messrs George B. Hogaboom, Col. J. H. Hansjosten and S. E. Hedden.

Walter C. Gold of Philadelphia, Pa., then read his paper on "CLOSER RELATIONS BETWEEN EMPLOYEE AND EMPLOYER IN THE WORK OF THE AMERICAN ELECTRO-PLATERS' SOCIETY." This paper is published in this issue of THE METAL INDUSTRY.

THE THIRD DAY, JULY 3.

The morning of the 3rd was taken up with a business meeting, election of officers and selection of the 1920 convention city. The following were elected to serve for the coming year: President, Oscar E. Servis, Chicago Branch; first vice-president, Sylvester P. Gartland, Rochester Branch; second vice-president, Philip Uhl, Philadelphia Branch; secretary-treasurer, J. E. Sterling, New York Branch; editor, H. H. Williams, St. Louis Branch. Rochester, N. Y., at the earnest solicitation of the enterprising branch of that city was chosen for the 1920 convention and it will be held for four days instead of three.

One of the important steps taken at this meeting was the vote taken to allow the publication by trade journals of matter appearing in THE MONTHLY REVIEW ten days after the issuing of the Review.



SOME OF THE PRINCIPAL ACTORS AT THE CONVENTION

Papers read at this meeting were "The Cleaning of Metal Work," by S. D. Benoliel, Philadelphia Branch, and "Some Electrical Connections and Manipulation," by L. M. Graham.

The afternoon of the third day was spent most profitably at the University of Pennsylvania, where the grounds, buildings and particularly the chemical laboratory were inspected and a technical session was held. The following papers were read and discussed: Paper by Dr. Hiram Stanhope Lukens, of the University of Pennsylvania. Subject, "On the Determination of the Wearing Properties of Electroplate by Means of Physical Tests"; "A Report Upon the Plans and Progress of the Plating Investigations at the Bureau of Standards," Dr. W. Blum; "Factors Governing the Structure of Metal Deposits" (illustrated), Dr. W. Blum; "Notes on Black Nickel Solutions," G. B. Hogaboom, T. F. Slattery and L. B. Ham; "Fluoborate Lead Plating Solutions," F. J. Liscomb, E. Zalia Jencks and W. E. Bailey.

The convention closed in a blaze of glory which shone impartially on the faces of all of the members of committees responsible for the occasion, with a rousing banquet held on the night of July 3, in the banquet hall of the Bellevue-Stratford. About two hundred and fifty platers, their wives and friends sat down and for over three hours ate and listened to another fine talk by Statistican Cattell, who by this time was the platers' friend. Mr. Cattell was followed by President Fraine, Founder Charles H. Proctor and Walter C. Gold, who made short speeches. George B. Hogaboom presented Sergeant F. C. Rushton of the St. Louis Branch, who has just returned from France, with a large box, the contents of which were not named. Sergeant Rushton made a graceful speech of appreciation and then the induction of the newly elected officers took place. H. H. Williams, president of the St. Louis Branch, performed this ceremony in a capable manner. After the hymn "America the Beautiful" had been sung, adjourment was taken and the 1919 convention had passed into history.

HOW WE CAN BEST ADOPT STANDARDIZATION FOR PLATERS' SOLUTIONS IN INDIVIDUAL PLANTS

A paper read at the American Electro-Platers' Society Convention held at Philadelphia, Pa., July 1-3, 1919.

By Charles H. Proctor

I have taken as the title of my paper "Standardization" and how we can best adopt the method for individual plants.' Webster in defining "Standardization" states that it is an "act of standardizing, to cause, to conform with, or regulate by a standard, to establish or accept as a standard; specifically in chemistry to make a solution of known strength or composition for use as a standard."

If every great commercial or industrial plant or institution has reached the acme of efficiency they have done so upon the basis of standardization. We have heard much and also learned much about standardization during the years of the great world war and since the outbreak in August, 1914, all the great governments, who have been participants in the struggle for supremacy, have had their individual standards. Our own government has for many years specialized in standardizing all materials used in connection with the army and navy, although it is really not more than two decades since the standardizing of government products was started. About twenty years ago when I was engaged in the production of electrical and lighting equipment for fortifications and about every type of ship in the navy I remember that when the government inspectors visited our plant the material to be inspected was laid out in the inspection room, finished and assembled in complete detail. The inspectors would go over about 10 per cent of the articles, inspect them carefully and if they found no defects or imperfections in workmanship or the finish in the 10 per cent. examined, they would then pass upon the whole as being accepted.

Times have changed since then, the government having created standards for about every phase of production. We find standards for this, standards for that, in endless variety, yet the aim has been to produce the same results—a standardized product.

These standards, from a layman's viewpoint, have made the methods of production more intricate, yet the manufacturer or producer seldom goes wrong if he follows the "standard specifications" prepared for him by the government. In some very rare instances a mistake may develop in government standard specifications, but it is very rare. The Bureau of Standards at Washington, D. C., was created for the express purpose of standardizing ways and means best adapted for the production of material for the government. However, the Bureau is not only carrying on work for the government, but it is also helping our great commercial industries to develop standards for production in a thousand ways.

Interest of the Bureau of Standards

We all know of the splendid interest Dr. W. G. Stratton, director of the Bureau of Standards, has taken in our work and our society and also the interest our esteemed friend and collaborator, Dr. W. Blum has shown in the development of efficiency in the electroplating industry. We have all listened, on many occasions, to Dr. Blum's valuable talks and through him we are assured of the continued interest of the Bureau in our work as long as finances are forthcoming to carry on the work. In turn the members of the American Electro-Platers' Society will render the Bureau every assistance they can to carry on the work. They will tell the Bureau about their problems and what they desire to accomplish, giving them all the practical knowledge that will enable the Bureau to answer them intelligently and after all is said and done, production in the plating industry must be along commercial lines, instead of theoretical laboratory practice.

The Bureau of Standards can develop an efficient formula for you for any type of solution, giving the minimum and maximum efficiency of such a solution. In other words they can create a "standard" solution for you, but they cannot maintain such solutions as "standards" for you in your own plant, that is up to you. Theory and the "thumb and nail" rule methods do not maintain standards, they are only haphazard methods and future progress in the plating industry must eliminate them.

The future lies before the plating industry as it does with every great commercial enterprise in this country. Firms who have adopted standard methods of production will be in the front ranks of commercialism—the victors—the others being relegated to the rear and not

until they adopt standard methods that will carry them forward to the front ranks can they hope for an equal standing in the ranks of commercial competition. The American electro-plater, therefore, must be up and doing and equal to any emergency for the future world competition will force us as a great commercial nation to adopt the greatest efficiency in the production of all materials. Are we ready for the task that will eventually be imposed upon us?

Empires have fallen but the people still remain and passing events have proven that the people are greater than their governments. The vanquished people must work out their own future destiny from the ruins that their autocratic and imperial governments have brought upon them. It means hard work for them and it means competition in production for us, the sweat of the brow to eat the bread placed before us. The people who have been misguided by imperial and autocratic masters have awakened to the fact that years of hard manual and efficient labor can only repay the costs of their downfall. We shall have world competition and the American workman must meet it not only upon the basis of true co-operation of capital and labor but by efficiency in production based upon "standardization."

The American workman has lived better in the past and must live better than any other workman in any of the other countries, if he would maintain his standard of living. His returns for his labor have been greater than that obtained by workmen of other nations and must continue so. If he has earned more in money he has accomplished more in labor and production in a relative time, so he has been worthy of his hire, but in the future he must still become more efficient and this means the plater, too.

STANDARDIZING INDIVIDUAL METHODS.

Have you ever thought how easy it would be for you to standardize your own methods to suit your own individual plant and in this way produce greater efficiency, as well as become a more economic factor in the trade? It is being done in many plating plants even today by many of our fellow members. They have adopted simple methods which, in many instances, I have laid down for them and today they are working along lines of practical standard methods of production. They have eliminated guess work just as a man eliminates guessing the time of the day when he carries an accurate time piece in his pocket. Many years ago, while discussing some problems in plating with a chemist friend, he made the following remark: "If you can produce certain results under certain conditions from your plating solutions today, and if you reproduce identical conditions tomorrow you will reproduce identical results."

We know this to be true but in those years it seemed that sometimes the identical conditions of one day could not be produced on the following day. The above remark was made before the plater had volt or ampere meters, when quite frequently the plater would go to his solutions and find that he was drawing metal from his cathodes into the solution instead of depositing metal upon the cathode from the anode. The polarity of his generator would frequently switch over and in his absence, solutions would become contaminated due to reversal of the current. Not having any volt or ampere meters to control his solutions and the rate of deposition, which was all accomplished by guess work or by weighing the product, he had not commenced to apply the ampere law to deposition. Many platers even today are not using the law but they are going to because the law is one of the fundamental principles that govern the weight of deposits or in other words is a basic factor for "standardization" in electro-plating.

PRACTICAL STANDARDIZING

I might continue to elaborate upon similar lines of thought, but I am going to tell you as briefly as possible how many of our members have accomplished practical standardization by the aid of a standard solution they have developed for their individual plant. These solutions are controlled by volt and ampere meters and in many instances with the ampere hour meter, which controls the rate of deposition and with standard stock replenishing solutions which take care of the deterioration of the solution under continuous operation.

If we started at the beginning of "standardizing" plating methods it would be with the erection of a suitable building that would be best adapted for plating purposes. The building would be situated at a point between the basic production of the materials to be plated and the final assembling and shipping department. This would include the final polishing and lacquering. Production then would always be continuous or in other words, moving in the same direction.

The most approved method of light, ventilation and sanitation should be important factors in a new building. It is somewhat difficult to incorporate them in an old building, but when possible changes should be made. Modern facilities for handling the product should be installed and when necessary an overhead track system with compressed air or electric hoists should be used to move the product in bulk form to the cleansing and pickling tanks. Small steel articles should be mechanically cleaned and pickled by tumbling whenever possible, as it can be done at a low cost of labor. Standard cleaning and pickling solutions should be installed and should be maintained as such.

If mechanical and still plating are to be done upon a fairly extensive scale and solutions for electro-cleaning are included, then it is advisable to have two separate units for current—one at six volts and the other at twelve volts. In my opinion the separate unit system for mechanical and still plating is the most efficient if the plating is done upon an extensive scale, otherwise the three wire system would be advisable. When installing new generators always figure one-third in excess of the current needed for production as you will then prevent the overloading of your generator which naturally results in a greater tank efficiency and a longer life for the generator. Mechanical cleaning and plating should be confined to one section of the plating room and the still cleaning and plating should be confined to another part so that the operations will not conflict with each other. Tanks for mechanical and still plating solutions should be of the most approved type and all tanks that are used for plating should be controlled by volt and ampere meters, together with modern rheostats of sufficient current carrying capacity so that no loss of current will occur from the generation of heat due to resistance. Conducting bars and rods should preferably be of copper and of sufficient diameter or cross section to give ample current carrying capacity to the tanks without the generation of heat. This also applies to tank rods and connections.

Generators should be controlled by volt and ampere meters so that the full current generation can be read

when all the tanks are in operation. Panel switchboards should be used and gold and silver solutions should be controlled by a standard ampere hour meter, especially if heavy deposits of these metals requiring two hours or more for deposition are desired. The use of the ampere hour meter will save a great deal of money and it will pay for itself many times over.

The weight test was used for many years in silver plating steel knives and forks and is still in vogue in some plants. The method followed was, after polishing and cleansing the knife and fork, they were dried out carefully and weighed. The exact weight of the knife or fork was kept as a record and it was presumed that all the knives or forks would weigh about the same. The sample knife was then suspended upon a separate wire in the solution, the balance of the lot of knives and forks (say about twenty dozen) were suspended upon frames insulated with hard rubber, except at the point of contact with the articles being plated. At frequent intervals during the time of plating the sample test knife would be removed and dried in alcohol and weighed. If the knives were to have twelve pennyweights of silver (Troy) deposited per dozen then an allowance of two grains per knife was added for loss in finishing. The amount of silver deposited was then 26 grains and when this amount had been deposited on the sample test knife the entire batch was removed from the solution.

Today with the use of a standard ampere-hour meter the pointers on the dial are set according to the number of ounces of silver that are to be deposited. If it is desired to deposit 26 grains per knife then it would require 12 ounces and one pennyweight of silver for twenty dozen knives, and so the pointers on the dial would be set accordingly. When sufficient amperes have passed to the solution an electric alarm rings denoting that the amount of silver has been deposited. As the ampere law is a fixed law in relation to the metal being deposited then only when a sufficient amount of amperes have passed through the solution will the required amount of metal be deposited, irrespective of the time required.

As time is an important factor in standardizing methods of production then to produce efficient and rapid results in the shortest time possible we must have standard solutions of the highest efficiency, which means ounces of metal per gallon of solution if we desire to carry the greatest amount of amperes upon a given surface area. We must bear in mind that one ampere in one second, one minute or one hour will deposit a certain weight of respective metal, every additional ampere will deposit an equivalent amount of metal. So ten amperes will deposit ten times as much metal as one ampere in the respective time. Then what is most desired is a standard solution of the greatest efficiency and of a composition best adapted for the basic metal upon which the deposit must be applied.

Here is where the assistance of the Bureau of Standards comes in and with the assistance of the members of the American Electro-Platers' Society standard solutions can be developed that will prove of untold value to the plater and the plating industry. Create standard solutions of the respective metals and then leave the rest to the individual plater to maintain his standard solution upon a standardized basis. It can be done.

SUGGESTIONS FOR THE PLATER

Until such a time as we have universal standard solutions the plater should develop efficient solutions for his particular plant. First decide upon the composition of the solution, the number of ounces of actual metal per gallon of solution that will give the most efficient results. It makes no difference whether the solution is to be of gold, silver, nickel, copper, bronze, brass, zinc or in fact any of the other metals, the weight of metal as originally used in preparing the solution should be maintained. A low internal resistance of the solution should always be produced or in other words a highly conductive solution should be the aim of the plater in preparing his standard solution.

In my travels through the various sections of the United States I have found that some solutions, even though made up with the proper amount of metal and cyanide or acid, give poor results as far as efficiency is concerned, because the internal resistance of the solution was extremely high. In other words the amperes did not flow through the solution because they met with resistance that reduced the maximum of ampere efficiency, even as the most efficient mechanical machine will not produce its maximum of efficiency unless the friction of the various working parts is overcome to a minimum. Friction or resistance is overcome in machinery by the use of an efficient lubricant or specially devised bearings which in turn must be lubricated. So we might liken an efficient and a highly conductive solution to a mechanical machine that has all the elements in its combination to overcome the friction of resistance.

When you have finally decided upon the composition of the solution come to a decision regarding the temperature. A normal temperature is 70 degrees Fahr. The efficiency of gold and copper solutions is always increased by high temperatures. Properly prepared brass solutions are more effective at 100 degrees than at 70 degrees. Silver solutions should be operated at as near 70 degrees as possible. Many members of the Society claim that hot nickel solutions produce deposits in one-third of the time required for solutions of cold or normal temperatures. There is, however, a maximum temperature that can be used but beyond that maximum which should be about 160 degrees, the deterioration of the solution is too rapid and would prove a disadvantage as far as efficiency is concerned. It is also advisable to always control the temperature of solutions with standard instruments that can be purchased from reliable manufacturers and such instruments have automatic control when set for any desired temperature above normal.

After an efficient standard solution has been installed the next step is to decide how much metal must be deposited upon the articles to give a satisfactory finish or wearing surface or a finish that will stand up under a specified test such as the government requires. Some experimenting will be required to decide this question. The ampere law, as applied to the deposition of the various metals, will have to be studied very carefully, and the voltage to support the amperes will have to be considered because the volt is the pressure that supports or carries the load. When solutions are low in conductivity more volts will be required to force the amperes through the solution. It must be remembered, however, that the ampere law is 100 per cent. Efficient solutions that are properly prepared can be worked very close to the point of 100 per cent, but it is well to make tests because very few solutions give this maximum of efficiency.

When the electro-chemical equivalent and specific gravity of a metal is known and this knowledge can be gained by studying any reliable text book, the

thickness of the metal deposited per hour with a given current density may be readily calculated and from this the thickness per hour for any given current spread over a suitable area may be deduced. When you have compiled the data for the various kinds of articles and surface area that is to be plated, figuring on the basis of tank loads you have then created a standard for your own individual use; based upon the weight of the metal to be deposited, the number of volts and amperes and the specified time required to deposit the metal upon the surface area of your tank load.

For example, we will presume that you have installed a very efficient copper cyanide solution made up on a standard basis with a definite amount of metal per gallon, free cyanide, conducting salts, etc. The tank has a solution capacity of say 500 gallons, you have figured out that you can obtain a deposit of sufficient thickness that will answer your specifications either individually or otherwise in thirty minutes using 4 volts and 400 amperes, figuring on a basis of 90 per cent. efficiency of the solution. It would then seem that if the solution could be maintained at the same maximum of efficiency day by day, under the same conditions and upon the same surface area you would be able to reproduce identical results, or in other words you would have standardized your solution, your methods of control and a definite production.

It is not a difficult problem to produce a standard solution, to apply efficient methods of control, to figure out the amount of metal to be deposited on the surface of your product based upon the ampere hour law, but it is a somewhat difficult proposition to control the solutions day by day to produce the same efficient results. It, however, is being done, many of our members accomplishing it even with brass solutions which as a rule are more difficult to control than any other solution, except perhaps a bronze solution. This is perhaps due to the fact that two metals have to be considered in these solutions. One of our members recently informed me that he had adopted standardized stock solutions for replenishing his brass solutions. He had previously had considerable trouble maintaining the brass solutions so that they would give a uniform color and a satisfactory thickness of deposit day by day. The amount of chain that was plated was 28 tons per day in the busy seasons, so it was a nerve racking proposition under the old method to keep up the production. However, since he has adopted standardized methods of replenishing with concentrated stock solutions and with complete current control his troubles have entirely ended.

Of course, this plater spent some time in developing his system for 28 tons of chain, such as we see used for non-skid tire chains, causes some solutions to be "dragged" out when they are run for 24 hours per day. It is not the metal, cyanides, conducting salts or even the water used in the solution that are dragged out as separate factors, but the entire composition of the solution comes or is dragged out and must be replaced to maintain an efficient production. The decomposition of the free cyanide due to anode reduction, the evaporation of the water used in the solution, all such factors had to be considered in preparing the concentrated stock solutions for replenishing purposes, but this plater and other platers have accomplished it and so can all platers.

Replenishing stock solutions should be made up in concentrated form upon the basis of the original formula, using the least amount of water possible, but with the increased amount of cyanide required as free cyanide to replace decomposition under electrolysis. The same method would apply to any type of solution, acid or alkaline. The plater who I mentioned above makes additions to his solutions when they are running to their full capacity about twice a day.

If the amperage during the time of replenishing the solution which should always be made according to the standard measure of volume—gallon or otherwise—should fall below the normal amount that has been figured out based upon the total surface area or tank load of work, then small proportions of cyanide should be added per gallon of solution. I would suggest that you start with 1-4 ounce per gallon, but with acid solutions 1-8 ounce per gallon should be the maximum added at one time. If the amperage does not then return to normal and if everything else is as it should be then small proportions of the stock solution in addition to the regular amounts should be added. The voltage and amperage should then become normal.

If what I have written creates an incentive to produce a higher basis of efficiency in your individual plant, gives you some ideas along which lines you can produce a "standard," then I have been fully repaid.

What has been accomplished by one plater can be accomplished by another. We are entering upon an age of standardization, are you then prepared to do your share in producing the results so much desired in the plating industry. It will mean much to you financially, it will make your tasks easier, you will produce better and more efficient results from your labor and it will make you a greater factor in the world work.

CLOSER RELATIONS BETWEEN EMPLOYER AND EMPLOYEE IN THE WORK OF THE AMERICAN ELECTRO-PLATERS' SOCIETY.

ADDRESS BY WALTER C. GOLD, PHILADELPHIA, CHAIRMAN PUBLICITY COMMITTEE.

In the work of "rounding up" the members of our society in my capacity as chairman of the Publicity Committee I have come to the conclusion that much better results would have been obtained had I had the authority and data in hand to enable me to appeal directly to the employers, setting forth the advantages to be derived by sending their foreman platers (members of this society) to this convention, instead of writing the members of themselves. It must be constantly borne in mind at all times that the function of this society is to educate its members and lift them to a higher plane, and in this action the employer also is materially involved. We meet in convention for two specific purposes: First, to improve ourselves in our work. Second, for rational and beneficial enjoyment. This convention was carefully planned upon a "fifty-fifty" basis, i. e., half work and half play. We remember the old adage: "All work and no play makes Jack a dull boy." So that through your attendance at these annual conventions and are benefited spiritually, mentally and physically. You go back home with renewed zest for your calling. There is no truer saying than "Monotony kills." Everyone should

have a change of scenery, of environment—meet new faces and breathe a different atmosphere, at least once a year.

The convention idea grows. Men realize more and more each year the benefits to be derived through the getting together of one industry and exchanging ideas and views. Big business has its conventions—witness the recent Carbuilders' convention at Atlantic City, where the Pennsylvania Railroad Company and Baldwin Locomotive Works had wonderful exhibits of locomotives. I believe these conventions should last a week instead of three days. More benefits would result to both employer and employee if a whole week were devoted to the work. The recent Medical convention at Atlantic City lasted a week and was largely attended by physicians from all over the country. Many of you have come long distances and that fact alone warrants the longer convention period. The efforts extended in preparing for the convention also merits the whole week. It is almost as difficult to plan for three days as for six or seven.

In planning this convention we have thought constantly of the next convention city. We shall turn a package over to the secretary of that city containing a sample of everything we used here, including the signs for the automobiles. We have had registration cards prepared containing name and address of each member, as reported by the secretary of each branch. The cards are also printed "Employer's name————, Employer's address————." My suggestion is that the next convention city secure, months ahead, the name and address of each employer and send a letter setting forth the actual benefits to be derived on both sides through attendance at the eighth annual convention, and suggesting that their foreman plater be sent by the company, firm or individual. This means, of course, that his salary and expenses be paid. If this course is adopted I am under the impression that fully several hundred more men would attend.

An instance of cordial co-operation between employer and employee came to my notice last week. One of the members of the Philadelphia Branch put in his application for the three days' absence necessary to attend this convention. With his application he filed a Souvenir Program so that his employer could see just why he wanted to be away. Word came from the office that he would be given not three days but this whole week, with full pay. That's the kind of treatment which will encourage our men to strive to better themselves and be enabled to render more and better service. If I employed foremen platers I would not wait to be asked for the time off—I would instruct my men to attend a convention of this type, considering that it would be just as much to my interests for him to attend as his own. A plater must study constantly to keep abreast of the times, just as does the up-to-date physician. My father was a progressive doctor and I remember how many years ago I used to take bound medical journals to other physicians each week—thus passing them around so each could learn just what was going on in the medical world. In his day (he died 37 years ago) doctors had no conventions as recently met at Atlantic City—they were dependent upon books and medical journals. Just so it is with the plater—so many advances are taking place in the industry that unless one meets his fellows in convention work he becomes a "back-number." So I say to you gentlemen that none can afford to miss the next convention or subsequent ones. The *Monthly Review* is fine, but you need the personal contact of your fellow-platers to keep abreast of the times.

Another suggestion I have is that a National Convention Committee be created to act in an advisory capacity. When we started to plan for this convention back in February we were absolutely without experience. Our only basis to commence work was a program of the last convention held at Detroit and a letter from President Fraine. This Advisory Committee could consist of members of the society who became affiliated with the work back in 1909. A representative committee would consist of say Messrs. Proctor, Hogaboom and Fraine or Servis. These gentlemen could advise the convention city how to proceed and to avoid possible mistakes and poor arrangements—in fine, to avoid the errors of past conventions and suggest new and original ideas for consideration. It must be frankly stated by the speaker that were it not for Mr. Proctor's assistance our Souvenir Program would not be as complete as it is. "Experience is a splendid teacher" and a committee consisting of experienced members would be a great help in preparing for future conventions. We needed advice about this matter of advertising as it was rumored that the national body was opposed to advertising as a means to raising funds; but we did not believe it was opposed to legitimate advertising and so we went ahead with the campaign. It was just here that the advisory board or committee would have rendered useful service. Gentlemen, the supply men are behind you to make these conventions a success. We estimated that we should need over three thousand dollars to run this convention and pay all expenses. From what source was it to be obtained? We concluded that if a proper program be offered the supply men, they would cordially support it. The rates were: whole page, $100; half page, $60; quarter page, $35. The result was that $2,200 was thus obtained. The proposition was put to them on a commercial basis and not from a philanthropic point of view and they generously responded. The program cost 35c. per copy and netted about $1,500. Now I believe that if the employers are properly approached they, too, will cordially support the convention.

The total membership of the society is 824; let the slogan be: One thousand members for the A. E. S. by July 1, 1920. Let every branch begin a campaign this fall to increase the membership. We are going at it here in Philadelphia this coming October and we hope to have one hundred members next year instead of the present sixty-one. We are going to tackle the proposition in a systematic manner and we feel sure that the goal will be attained.

Having need to address a large manufacturing establishment here in Philadelphia about what was the course of procedure at the Hardware convention held in Atlantic City two years ago, the president wrote: "I am afraid I cannot be a great deal of help to you as I do not know what the objects of your society are." I wrote and said: "Please accept my thanks for your letter of June 2d. The American Electro-Platers' Society is strictly educational. The aim is to better educate foreman platers in the art of electroplating. I am sure that if your foreman joined the society, he would be materially benefitted."

When this convention is over were are going to begin a campaign amongst the Philadelphia manufacturers with a view of increasing our membership."

We have saved about one hundred souvenir programs and I shall be pleased to send them to the secretaries who apply for them. These could be used to assist in influencing new members. The splendid address of Su-

preme Secretary Servis, printed in the recent issue of the Monthly Review, could also be reprinted for this purpose. He very forcibly sets forth the advantages attained through uniting with this organization.

Gentlemen: The substance of this paper is this: On the tenth anniversary of the A. E. S. cannot definite action be taken to materially interest employers and members in these conventions? If the work is to grow, then a much closer union must be fostered and effected between this society and the employers of its members! If each one of our members could feel that his employer was cordially behind him; that he sympathized with him in his sincere effort to improve, how much more interest the plater himself would take in these gatherings! It would be something to look forward to each year!

If the suggestion of interesting the employers meets with your approval it would seem best that definite action be taken at this convention authorizing the next cenvention city to act accordingly. The fact of the matter is that the number of platers who attend the conventions is out of all proportion to the number of supply men who come. This should not be. It indicates, however, that the platers do not properly support the conventions. If the platers should support the conventions in the same ratio as do the supply men, then a small attendance of platers is detrimental to the interests of the society. I feel, therefore, that it is imperative that immediate action should be taken to interest all employers in these conventions.

The A. E. S. is no longer an infant. It is ten years old. The time has come to make plans for a larger and better society—an organization which will promote the art of electro plating. The industry must move forward; it cannot stand still; it cannot go backward. Let "FORWARD" be our watchword.

THE EXHIBITORS AND WHAT THEY EXHIBITED.

Celluloid Zapon Company, New York.—Articles finished in various methods by the different lacquers. Distributed a booklet on finishes.

J. B. Ford Company, Wyandotte, Mich.—"Wyandotte" cleaner. The Ford company distributed their booklet, "Metal and Other Cleaning Problems—Their Solution," also a green feather and a metal paper cutter.

Walter Fraine, National Cash Register Company, Dayton, Ohio.—Two handsomely finished cash registers, metal cases, finished in mahogany and cherry.

W. A. Fuller Company, Greensburg, Pa.—"Natrolin" metal cleaners and booklet.

Walter C. Gold, Philadelphia, Pa.—Platers' supplies, including polishing compounds, buffing wheels, Tampico and wire brushes, nickel lime composition and muslin buff; a general platers' supply catalog, and other booklets.

International Chemical Company, Camden, N. J.—Samples of "Eclipse" soap chips for barrel cleaning, "Climax" cleaners, "International" platers' compound for removing buffing compounds, "White Rock" potash, caustic soda compounds, "K. W. T." cleaner, "Excelsior" compound for ball burnishing and the "International" lubricating compound for stamping, blanking and drawing.

Maas & Waldstein, New York,—Varnishes, enamels and lacquers.

Metz Structural Steel Company, Bridgeport, Pa.—The Metz electro-plating and cleaning agitator machine, also booklet illustrating and describing this machine.

The Norton Company, Worcester, Mass.—Alundum grinding and polishing compounds.

Nivin Manufacturing Company, Chicago, Ill.—Nivin metal parts washing machine, also booklet.

Oakley Chemical Company, New York.—Samples of "Oakite" and "O. R. C.," samples of work treated with these cleaners, including stove tops, plumbers' supply goods, automobile parts and trimmings. Booklets on "Oakite Service for Automobile and Aeroplane Manufacturers" were distributed.

Roessler & Hasslacher Chemical Company, New York.—Metal articles plated with metal cyanides, samples of cyanegg and sodium polysulphide.

Louis Schulte exhibited 24 inch wide nickel-plated and copper-plated steel sheets for stamping and spinning. These plates were manufactured by Folansbee Brothers Company, Pittsburgh, Pa.

TEN YEARS!

A Retrospect by G. B. Hogaboom.

"Ten years! It does not seem possible that within that short space of time the attitude of electro-platers in regard to their methods could have changed so greatly. Not only has the plater himself been benefited, but his employer and the manufacturer of his supplies and all those interested in electro-plating have taken a more personal interest in the work. As one plater at the convention tersely remarked, "The American Electro-platers' Society has taken the plating-room out of the cellar and put it on the top floor."

The two things done at the convention illustrate the change of direction of the plater's thought—the releasing of all papers printed in the Monthly Review for publication by other journals; and the keen interest taken in the paper read by Dr. William Blum, which portrayed so vividly the effect of different plating conditions upon the deposit. The society needs more of such papers—papers with actual conditions backed up by proof.

It is to be regretted that the whole way to broadness was not opened and provisions made for permitting the future foremen platers—the future members of the society—the men to whom we must look to carry on the work so well begun—the assistant foremen platers—to become associate members of the society. As sure as the science of electro-plating is advancing, those who are now entering the work will advance, also, and if the society is to increase in strength and power it must admit to its membership those who can and will contribute the enthusiasm of youth and progressiveness.

What the next ten years will bring forth is difficult to prophesy, but one thing is certain, and that is that unknown conditions will give way to known conditions and the plater will be freed from the bonds of uncertainty."

ELECTRO-PLATING HINTS.

Electroplating is the process of depositing one metal on the surface of another, and generally, baser metal, in order to give the latter the appearance of the former, or the same properties in regard to corrosion, etc. This is an electrical process, and before proceeding further, it is well to understand the various electrical terms and definitions.

The VOLT is the unit of electrical pressure or electromotive force required to send 1 ampere through a resistance of 1 ohm.

The AMPERE is the unit of current or rate of flow of current, and is the amount which, when passed through a solution of silver nitrate, deposits silver at the rate of .001118 grams of silver per second.

The OHM is the unit of electrical resistance which is offered to the passage of electricity by a column of pure mercury, 106.3 cms long, and of constant cross sectional area of 1 sq. m.m. at a temperature of melting ice (32°F.).

The JOULE is the amount of work that is done when 1 ampere flows under a pressure of 1 volt for one second.

The WATT is the unit of power which is absorbed in a circuit when 1 ampere passes under a pressure of 1 volt. One watt = 1 volt × 1 ampere. 746 watts = 1 HP.

The BOARD OF TRADE UNIT is the kilowatt-hour, or in other words it is the amount of work performed in 1 hour by absorbing the energy represented by 1,000 watts.

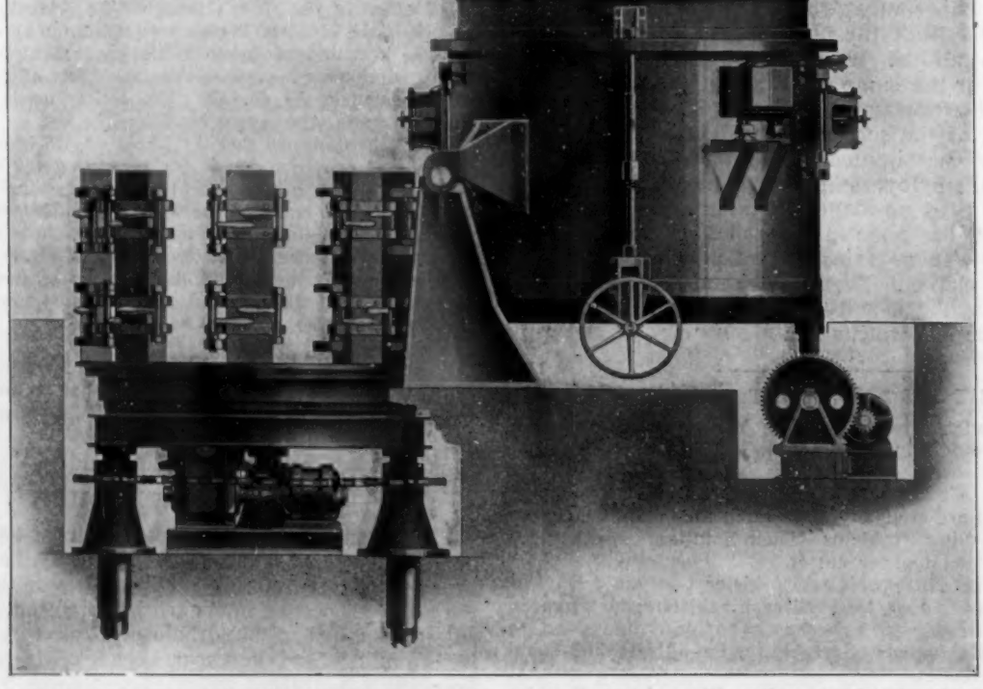
ELECTRIC FURNACE PROGRESS

A Symposium on Electric Furnaces at a Meeting of the American Institute of Chemical Engineers at Boston, Mass., June 18th, 1919, Brought Out Some Interesting Data Regarding this Type of Melting Furnace.

Electric Furnaces of the Resistance Type for Melting Metals

By L. F. Bailey, President, Electric Furnace Company, Alliance, Ohio.

All of the furnaces described in this paper are of the resistance type—their heating element consisting essentially of granular carbon placed in a silicon carbide trough—and are of the type that have for a number of years been in common use for heat treating and annealing steel, some of the most notable of these heat treating furnaces being the equipment supplied some years ago for the heat treatment of draw bar knuckles, and during the last year, installations for the heat treatment of Liberty airplane motor crank shafts (over half of which were so treated) and those for the heat treatment of cast steel anchor chain (all of which material was heat treated in this type of furnace).



BAILEY ELECTRIC MELTING FURNACE, 105 KW. NOSE TILTING TYPE, WITH CASTING TABLE.

The success of furnaces of this type in annealing and heat treating, indicated that furnaces of similar design, with detail modifications, would fulfill the requirements for the melting of brass and other non-ferrous alloys; and after a careful survey of the various requirements for brass melting furnaces, the type of equipment described in this paper was developed.

The first of these furnaces was put in commercial operation nearly three years ago at the plant of the Lumen Bearing Company, Buffalo, N. Y., for the melting of "Lumen"—a metal which, on account of its high zinc content, could not be commercially melted in open flame furnaces, and even in crucible type furnaces could only be melted with a relatively high zinc loss.

The principal facts taken into consideration as necessary to the development of a successful brass melting furnace were: (1) the metallurgical requirements; (2) the mechanical features; (3) the electrical characteristics; (4) the thermal efficiency, and (5) the commercial economy as compared with other types of melting equipment.

The obvious advantages to be found in an ideal electric furnace over fuel fired types for melting are: (1) the elimination of crucibles, which are one of the principal costs in the melting of brass in pit type furnaces; (2) the reduction in metal loss when handling zinc mixtures, on account of the slight vacuum under which all pit type furnaces are required to operate; (3) the ability to maintain a reducing atmosphere in the furnace at all times, which is impossible in fuel furnaces when operating with any degree of fuel efficiency—it being well known that copper alloys, as well as copper, have a high affinity for the absorption of undesirable gases when in their molten condition, this being equally true of other alloys and metals such as aluminum.

THE BAILEY FURNACES

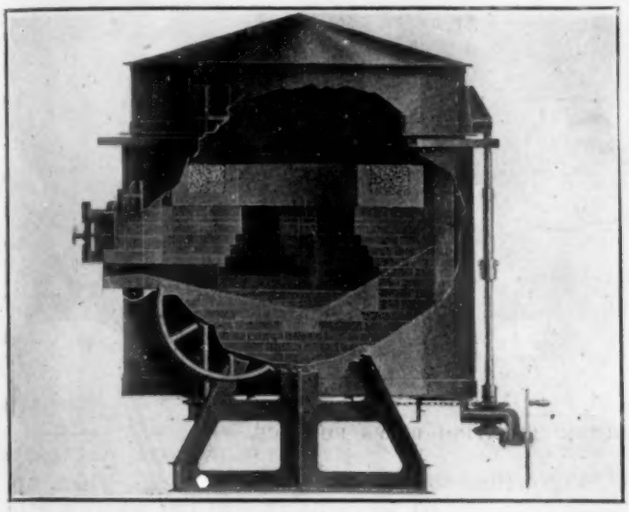
The furnaces now to be described are built in two regular types, the first—which has found wide application in foundries—is of the round tilting type; while the other, of rectangular shape, is the type used for melting large tonnage and for smelting operations.

The round type (shown in Fig. 1) is provided with a

circular resistor trough with the electrodes coming into the trough diametrically opposite each other, the resistor material being renewed by lighting the roof, as previously stated, while in the rectangle type, the resistor troughs are two in number and placed longitudinally along each side of the hearth, and are, therefore, straight. The resistor material, in this case, is charged by means of long shovels through a door at each end of the furnace and directly above the trough. A section of this round type furnace is shown in Fig. 2. This furnace is a standard 105 K.W. trunnion type with a rated hearth capacity of 1,500 lbs. and a melting rate of 600 lbs. per hour. These capacities, however, have in numerous cases been exceeded, as much as two tons having been placed in the furnace at a time, and the melting rate increased to more than 1,000 lbs. per hour, when operating under favorable conditions.

This furnace consists of a steel shell made of ½-inch plate, seven feet in diameter and approximately six feet high, mounted on the usual cast iron trunnions and brackets, and having the usual hand wheel tilting mechanism.

The interior wall of the furnace is substantially 5½ inches in diameter, with a wall of circular brick about 4½ inches thick. The space between this brick wall and the steel shell is filled with kieselguhr insulation. The steel roof ring is adapted to hold securely the skew backs of the domed arch, and is provided with a lower fin for dipping into the sand seal. The space above the roof dome and below the steel top is also filled with kieselguhr in the same manner as between the firebrick walls and the steel shelf of the furnace proper.



SECTIONAL VIEW OF THE BAILEY ELECTRIC MELTING FURNACE.

The hearth is located in the bottom of the furnace, and is composed of a mixture of carborundum fire sand and plastic clay material bonded with silicate of soda. The resistor trough is located above the bath and completely encircles the rim of the hearth line, although located a considerable distance above it, and is set on firebrick piers, so that the heat from the lower part of the fire sand trough is readily dissipated from this part of the trough within the furnace chamber.

This feature is of vital importance in the successful design and operation of resistance type furnaces, as all early experiments with furnaces of this type without this feature failed.

The resistor material contained in this trough and into which the electricity is introduced by means of the two carbon electrodes, as previously mentioned, radiates the heat generated in it to the roof of the furnace and thence down onto the hearth; while the heat coming from the lower part of the trough, between the supporting pillars, is also radiated directly to the bath. That this resistor ring has a radiating surface of over 40 square feet, accounts for the fact that there is no highly localized temperature in this furnace.

The control of the furnace is obtained by means of impressing voltages on the low tension side of a special transformer across the furnace terminals by a special selective oil break switch. The special transformer supplied with each furnace is wound for any convenient voltage, while the secondary of the transformer is provided with various voltage taps, usually giving a voltage radio of two to one on the low tension side. By means of this arrangement, the electrical losses are reduced to a minimum, and an accuracy of control obtained that is not possible by other types of equipment, and it is readily possible to operate over long periods of time without a greater variation in electrical input than a few per cent.

The only opening to the furnace, which is used for charging the material to be melted, is provided with a swing type plug door, the hinges being made of cast steel and attached to the furnace shell in a rugged manner. The pouring spout is a groove underneath the door, which enables the molten material to be poured without opening the door, the door itself being opened only during the charging or rabbling time. A false door, consisting of a ribbed cast iron plate, is also provided, so that when the main plug type door is open during the charging or rabbling operations, this false door can be dropped down, shielding the operator from the direct heat of the furnace interior.

This 7 inch diameter furnace is also built in nose tilting type, and is operatel by means of a motor driven screw mechanism at the rear of the furnace (shown in Fig. 2). In this type of equipment the charging door is placed at the rear, and a small spout arranged at the front for pouring the molten metal. This is a type of equipment that is particularly adapted to casting rolling mill slabs, when used in connection with the rotary casting table.

THE BOOTH ELECTRIC ROTATING BRASS FURNACE

By Carl H. Booth, President Booth, Hall Company, Chicago, Ill.

About five years ago we were associated in the design of several electric furnaces for the production of special chemical compounds. These furnaces were cylindrical in shape and arranged to rotate about a central axis through which the electrodes projected. At the time it was suggested that this type of furnace could be adapted to the melting of non-Ferrous metals, but there was no opportunity to carry on such work. An illustration of one of these furnaces is shown in Fig. 1.

In these earlier furnaces a door was provided in the cylindrical surface of the shell and lining, for charging and pouring, but we experienced considerable difficulty in maintaining the lining around this combination spout and door. Further, in pouring the furnace, it was troublesome and inconvenient to be obliged to place the ladle between the supports beneath the furnace. Consequently, in designing the present Booth Furnace, these difficulties have been overcome by placing the door in one end of the furnace, as shown in Figs. 2, 3 and 4, and having a tapping hole in the other end, as shown in Figs. 2 and 3. In this way the cylindrical surface of the lining and shell is unbroken by any opening. This

permits the continuous rotation of the furnace, and consequently the absorption of heat by the charge from all parts of the lining, which means no local overheating and uniform wear.

GENERAL DESCRIPTION—HOLDING CAPACITIES.

As a general rule, the quantity of non-Ferrous metal melted at one time, or at one heat, is less than the quantities involved in the melting of steel and iron, and, therefore, smaller sizes of furnaces are desirable.

To meet the requirements of the small foundry, as well as the large foundry, and the smelters and refiners, Booth Furnaces are built in the following sizes:

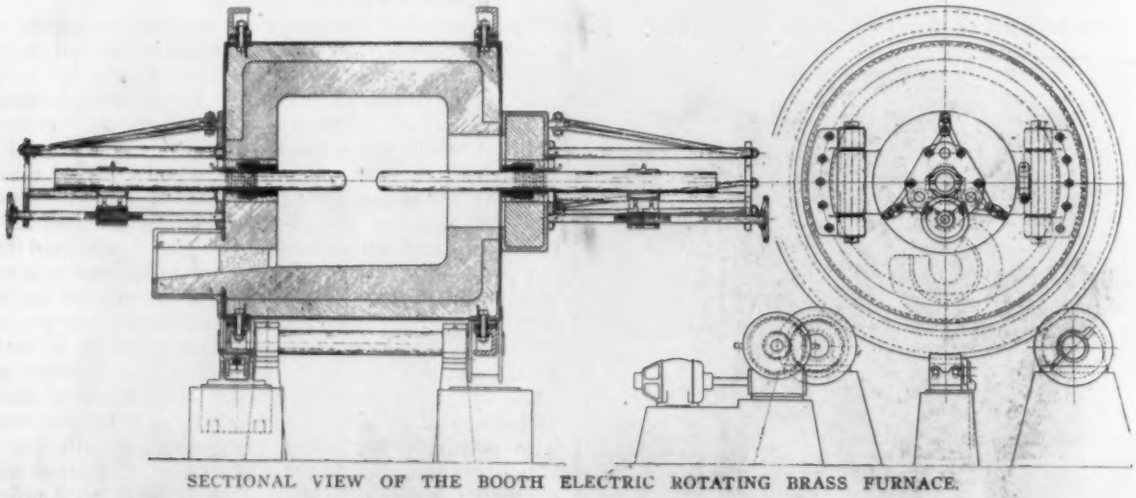
RATED HOLDING CAPACITY.	MAXIMUM HOLDING CAPACITY.
250 Lbs.	350 Lbs.
500 Lbs.	750 Lbs.
1,000 Lbs.	1,500 Lbs.
2,000 Lbs.	2,500 Lbs.
3,000 Lbs.	4,000 Lbs.

tions per minute. No gearing is required encircling the furnace. The current is carried to the electrodes by means of short pieces of flexible cable, which connect to the above mentioned track, and the current is supplied to the track by means of shoes which press against them and form a sliding contact. The electrodes are regulated by means of screws shown, and on small furnaces are entirely hand-operated, but on the larger furnaces, automatic electrode control is used, thus doing away with the necessity of close watching on the part of the operator.

In the small furnaces, the door is in one end only, but in the larger furnaces both ends are provided with a door.

POWER CONSUMPTION AND SHRINKAGE.

In melting down turnings, borings and grindings with a hot furnace, 30 to 40 minutes is required per charge. With the small furnace shown we have had a power consumption as low as 240 kwh. per ton; the average would be between that and 300 kwh. per ton.



SECTIONAL VIEW OF THE BOOTH ELECTRIC ROTATING BRASS FURNACE.

There are many small plants where heats of 50 to 350 lbs. are required, and the smallest size furnace shown above answers the purpose with great economy, whereas larger furnaces to operate efficiently must produce more metal than is needed. Further, there is also a great disadvantage in trying to pour a ton of brass into small castings and keep the metal hot. We know of a large company having a one ton electric furnace where it is taking them 50 minutes to pour a heat into castings, and they are finding great difficulty in doing so. Further, the great variety of mixtures made by small foundries requires a small efficient unit, from which "short" heats can be taken, producing great flexibility of operation. On the other hand, smelters and refiners frequently require furnaces of relatively large holding capacity, which will turn out a considerable amount of metal per day.

Any one of the above furnaces is guaranteed to melt and bring to pouring temperature a charge of its rated holding capacity in an hour's time, when the furnace is hot.

MECHANICAL DETAILS.

The illustrations and drawings give a very good idea f the general design of the Booth Electric Furnace.

Fig. 2 is a cross-section or diagram, illustrating clearly the principle of construction. As will be noted the furnace rotates on rollers, and is carried by two cylindrical tracks. The rollers are driven at the proper speed by a motor, so as to rotate the shell at a speed of two revolu-

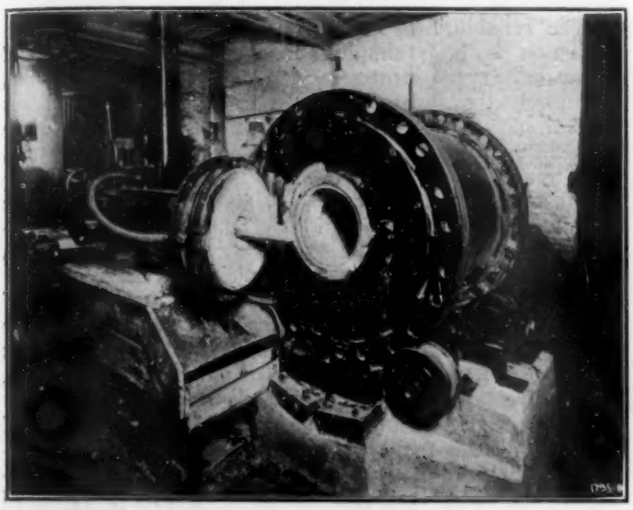
With yellow brass turnings and borings which are fairly clean, but on which no attempt has been made to remove any contaminating material, we have run heats with a total shrinkage of 1½ per cent. These borings, when charged, were in the same condition as received from the seller. Of course the percentage of shrink will depend on the amount of oil, dirt, iron and other extraneous material present, but the actual metal loss has proven to be very low. Due to the active mixing action of the rotation, the heat is applied to the turnings and borings in such a uniform manner that there is no local overheating, and a quick melt with low metal loss is obtained.

In melting concentrates from floor sweepings, which contain a considerable amount of dirt and moisture, and which when melted in crucibles showed a shrinkage of 30 to 40 per cent, the Booth Electric Furnace over quite a number of heats averaged 17½ per cent shrinkage.

In melting ingots and heavier brass scrap, a heat will average from 30 minutes to an hour in length of time, depending upon the kind of metal poured and the size of the charges. A 300-lb. charge of copper ingots requires about an hour to melt and pour, while a 300-lb. charge of yellow brass about 40 minutes. The shrinkage with yellow brass ingots averages amout 1 per cent, and on red brass and high copper bronze, under 1 per cent. With the furnace hot, the power consumption will run from 250 to 350 kwh. per ton.

One heat was made with a charge running about 50 per cent zinc and 40 per cent copper, totaling 250 lbs.; 249 lbs. of metal were poured, and the power consumption was 240 kwh. per ton. This was in the latter part of the day when the furnace was hot, and the metal charged was all clean metal. The ladle was weighed as it was brought to the furnace, and then weighed after the metal had been poured into the ladle. Great care was taken on the part of the operators not to overheat the metal, and this is simply an indication of what results are accomplished where sufficient attention is given to melting. The heat following was a charge of 225 lbs. of red brass ingots, from which 224½ lbs. of metal was poured.

It is particularly difficult to keep account of the metallic shrinkage in a small furnace of 250 lbs. holding



THE BOOTH FURNACE OPEN FOR CHARGING.

capacity, and consequently great care has been exercised. Arrangements were therefore made for a scale near the furnace upon which the heated ladle was weighed when brought to the furnace and again weighed when filled with metal. Any drippings from the furnace were carefully collected and weighed, and any slag coming out with the metal was skimmed from the pot before weighing, as even a small amount of one pound would mean almost one-half of one per cent shrink. With a larger furnace, it would be much easier to make shrinkage tests without danger of as large a proportionate loss, as with the smaller furnace. In other words, if one pound of metal poured did escape being weighed, it would not represent as much shrinkage as in the case of a small furnace.

LINING WEAR.

To date about 130 heats have been run and the lining on the furnace illustrated shows no perceptible wear. The lining is sintered upon its surface and appears to be in as good condition as when originally installed. This is the first lining installed in the furnace. The material of which the lining is made is such that it does not shrink, spall or crack, although the furnace is run on an average of 8 hours per day. Based on a great many years' actual experience in the operation of electric furnaces of many types, our engineers feel confident that linings of this type will last from 600 to 1,000 heats, and possibly longer, with proper care on the part of the operator.

Another important characteristic of this method of lining is due to the fact that there are practically no joints, which serves to keep the lining clean and prevents any considerable amount of slag or metal sticking to it.

ELECTRODE CONSUMPTION.

With furnaces of this type the graphite electrode is to be preferred, due to its greater conductivity, which permits the use of the smallest size of electrode practical for the current to be carried. On this furnace electrodes of 2½ inches diameter are used, machined and equipped with what is known as nipple joint. These are 30 inches in length. The electrodes enter the furnace through graphite sleeves. This opening is also protected by a water cooling copper casting which serves to protect the electrodes from burning at this point.

Even with the small 250-lb. furnace shown, the electrode consumption is low. If the furnace is kept in operation fairly continuously during an 8-hour day, the consumption will average about 3 lbs. per ton.

The electrode supporting mechanism has been so designed that it not only permits of adjustment in case electrodes are slightly out of line, but at the same time serves to protect the electrodes from breakage, due to the accidental falling of bars on other material against the end of the furnace.

POWER FACTOR.

A great deal of difference of opinion still exists among operating engineers as to the proper power factor best to be used in connection with electric furnace loads. With small furnaces of the type just described, our judgment is that as low a power factor should be adopted as can safely be permitted with the conditions met with at the point of installation. This can be varied to suit different conditions by modifications in the design of the equipment. If a power factor as low as 70 per cent is permitted, the result will be that the furnace operator need not stay at the electrode hand wheel control to any great extent, but may be employed in getting his charge ready for the next heat, making suitable records and other miscellaneous duties. If, however, a higher power factor is required, the furnace can be readily operated, but will require more attention on the part of the operator, unless automatic electrode regulators are provided.

It is our judgment that in case of installation of a battery of small furnaces, providing a sufficient advantage in power rate could be obtained by obtaining a higher power factor than 70 per cent, it would be best to install automatic electrode regulators. There would also be compensation in reduced labor cost, due to the fact that one man could take care of a large number of furnaces under such conditions.

On small furnaces of the size described, one furnace operator can conveniently handle three furnaces without the use of automatic electrode control. This would, of course, not include the miscellaneous labor for charging and making up the heats, but one extra man could easily take care of this.

With the 250-lb. furnace described by this paper, we can easily charge, melt and pour a ton of metal in 7½ to 8 hours. This same rate of speed is maintained for all sizes of Booth Electric Brass Furnace. With the larger sizes, it will, of course, take a little longer time to charge and pour, but proper mechanical means can be provided for charging so as to reduce the time to a minimum. If the furnace is used entirely for melting turnings and borings and other small scrap, the daily output will be slightly increased.

THE DETROIT ROCKING FURNACE FOR MELTING BRASS AND BRONZE

By H. M. St. John, Sales Engineer, Detroit Electric Furnace Company.

The rocking electric furnace was developed by H. W. Gillett of the U. S. Bureau of Mines, in co-operation with the Detroit Edison Co., at the plant of the Michigan Smelting & Refining Co., Detroit, Mich. The experimental development was followed immediately by a commercial development, which, during the past year, has resulted in an extensive use of this furnace for melting yellow brass, red brass and bronzes of various composition. It is the purpose of this paper to discuss the results so far obtained with the rocking furnace in regular industrial use, and to outline the possibilities of the furnace in melting brass and bronze.

The rocking electric furnace consists essentially of a cylindrical steel shell, lined with suitable refractories, and mounted on rollers and ring gears which permit it to be rocked through any desired arc of revolution up to a maximum of 200 degrees. This rocking motion is actuated by a small induction motor through a reducing gear immersed in oil and enclosed in a tight gear case. The action of the motor is controlled by an automatic reversing switch which may readily be set to give the desired angle of rock. The source of heat is an electric arc between horizontal graphite electrodes axially placed in the furnace and meeting at the center of the cylindrical melting chamber. These electrodes are controlled by hand wheels, which permit them to be entirely withdrawn from the furnace chamber when so desired. One of these electrodes is set in such a way as to locate the arc approximately at the center of the furnace and is, thereafter, allowed to remain stationary, while the operator controls the arc by adjustment of the other electrode.

During charging the electrodes are withdrawn until their tips are flush with the inner wall of the furnace in order to avoid striking them with heavy pieces of metal which might cause breakage. The furnace is then closed, the electrodes brought to the operating position, and the arc started. During the first few minutes of the melting period the furnace is not rocking, since rocking at this stage is unnecessary and might cause electrode breakage if started prematurely. As the metal becomes soft, rocking is started, through a small angle at first and reaching a maximum rock as the metal becomes completely molten and enters the superheating stage. During this complete rock the molten metal washes the inner lining of the furnace to within a few inches of the charging door at either end of the oscillation, at the rate of approximately two complete oscillations per minute.

When the charge is molten, it lies in the lower half of the furnace cylinder at a distance from seven to ten inches from the arc. The metal is heated by conduction from the entire refractory lining, as well as by direct radiation from the arc. The stirring action, due to the constant rocking motion of the furnace, is sufficiently effective to maintain a constant temperature throughout the melt, and thus prevent the surface overheating which would result if the furnace were stationary.

When the melt has reached the desired pouring temperature, the arc is broken and the metal is poured through the spout beneath the charging door. The door itself is not opened until the furnace is ready to charge. If, for any reason, it is impossible to pour the metal immediately, the charge may be held in the furnace without danger of overheating, since no part of the furrace structure is appreciably hotter than the metal. If desired, rocking may be continued during this period, in order to insure a perfectly uniform temperature and a thorough mixture of the alloying metals.

The indirect arc lends itself excellently to the maintenance of a uniform power input and a steady electrical load. After a little experience the operator learns to judge from the kilowatt-hour input how to adjust the rocking of the furnace, and when the metal is hot enough to pour. In other words, he knows what condition the metal is in by observing from his motor how many kilowatt-hours of heat he has put into the furnace. This is the most convenient and satisfactory method of controlling the temperature, as well as the heat input, and works extremely well, even with an operator of very mediocre intelligence.

The reliability of the furnace is high, since its construction is both simple and rugged. Its cylindrical form permits the strongest possible refractory structure; the method of heat generation is simple and involves no complicated parts, electrical or otherwise; the gears and other parts of the rocking mechanism are sturdy and not exposed to high temperatures, while the electrical control mechanism is as simple as it can be made and very seldom a source of trouble. There is nothing complicated about the controls, and even the greenest of operators rapidly becomes proficient in their use.

The power input of the furnace is relatively large, and its thermal efficiency high, this desirable combination resulting in a high productive capacity. The arc is not more than ten inches from the metal on a full charge, while it is approximately eighteen inches distant from the nearest refractories—the vertical end walls—and 20 inches from the cylindrical walls. This makes possible a rapid rate of heating without injury to the refractories, while overheating of the surface layer of the metal nearest to the arc is prevented by the constant mixing which it undergoes. Using 2,000 lb. charges, the rocking furnace will produce approximately 2,000 lbs. of molten brass per hour, melting time, or about 1,500 lbs. per hour, elapsed time, the latter including time consumed in charging, pouring, and incidental delays. This is a higher productivity capacity than can be obtained with any other electrical brass-melting furnace of similar size.

As already stated, the quality of the metal produced is a function of temperature control, through mixing, and the absence of impurities. Any electrical furnace which does not burn the metal makes possible the avoidance of impurities and thus compares favorably with fuel fired furnaces, which expose the metal to a rapidly moving oxidizing atmosphere which also contains sulphur and other undesirable products of combustion.

Accurate temperature control is difficult in these types of electric furnaces which heat their refractory walls and roofs far above the metal temperature, thns causing the metal to absorb heat even after the electric current has been turned off. In an arc furnace the heat input stops immediately when the switch is opened and metal can be held in the furnace indefinitely without danger of overheating.

In the rocking furnace a perfect mixture of the metals which go to make up the alloy can readily be attained, by virtue of the brick agitation which the molten metal receives. Even high-lead alloys can be poured from the furnace in perfectly homogeneous mixtures. The table below shows the results obtained with a series of heats, from which samples were taken of the first ingot from the first ladle and the last ingot from the last ladle

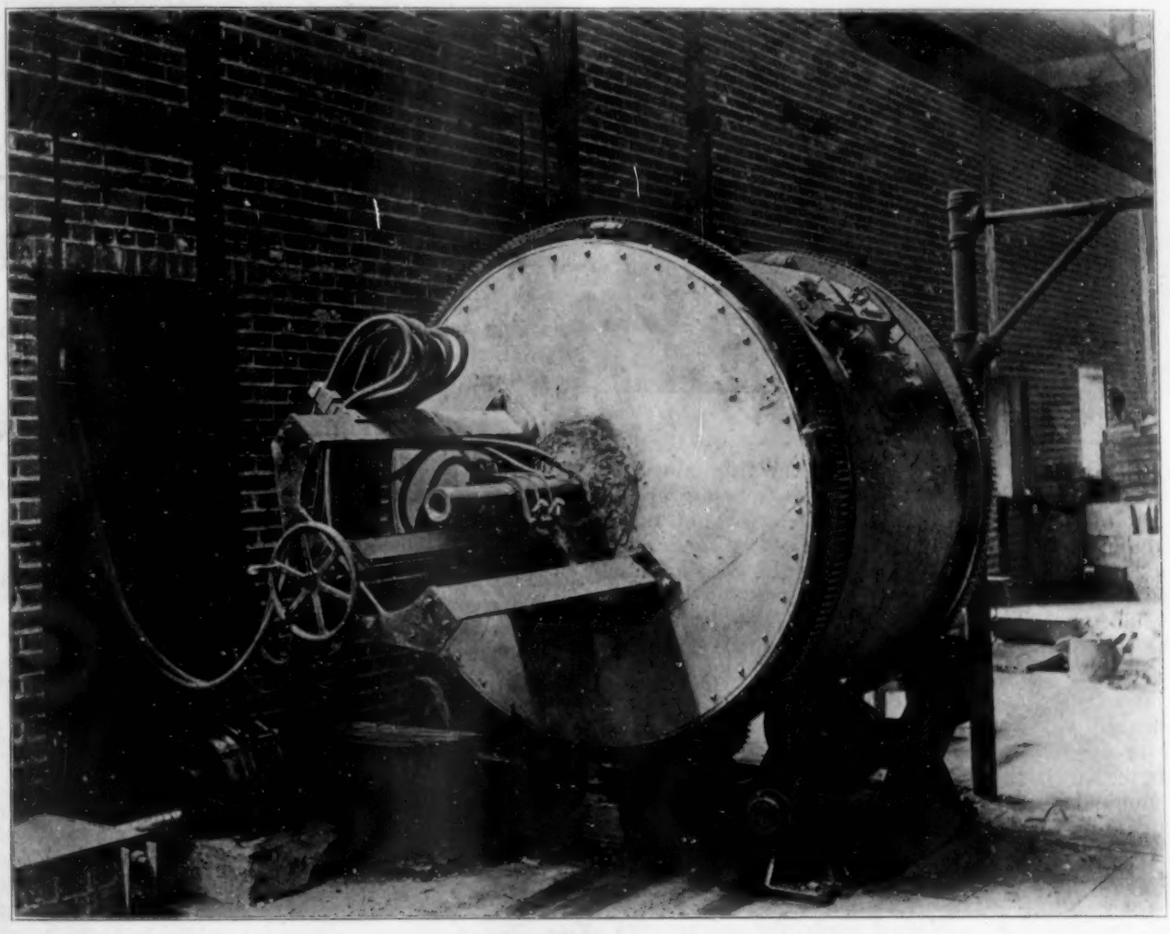
in each case. The variation in composition from heat to heat was due to the selective absorption of lead by a green furnace lining. While the variation in lead content between the first and last ingots of any heat is very small, it will be noted that in three cases out of four, the percentage of lead in the first ingot is higher than that in the last.

TABLE I.

Heat No.	Ladle No.	% Cu.	% Sn	% Sb	% Pb	% Sn plus Impurities
1	first	72.73	4.97	0.61	21.02	0.67
1	last	72.12	4.88	0.61	20.97	1.42
2	first	68.89	4.85	0.61	23.13	2.45
2	last	69.09	4.47	0.61	22.96	2.87
3	first	66.51	4.24	0.61	25.49	3.15
3	last	67.15	4.30	0.61	25.28	2.66
4	first	67.07	4.30	0.61	25.02	3.00
4	last	66.01	4.47	0.61	23.67	3.04

46	87.18	8.43	1.09	3.28	.020
47	86.68	8.37	1.37	3.56	.020
48	87.24	8.36	1.26	3.10	.020
49	85.84	8.20	1.21	3.75	.014
50	86.94	8.10	1.04	3.91	.014
52	67.80	7.64	1.36	3.20	.020
53	87.16	8.27	1.30	3.26	.014
54	86.96	8.27	1.33	3.43	.010
55	86.82	7.98	1.21	3.96	.025
56	87.20	8.27	1.25	3.27	.014
57	87.12	8.27	1.25	3.36	.016
58	86.80	8.59	1.21	3.39	.013
Average	87.05	8.25	1.27	3.42	.017
Max. deviation from average	0.75	0.60	0.35	0.54	.008
Ave. deviation from average	0.22	0.26	0.10	0.23	.004

The thermal efficiency of the rocking furnace is high, and the energy consumption per ton of metal melted is correspondingly low. The thermal efficiency of the furnace is considerably higher than that of any stationary type of indirect-arc furnace, even higher than that of the direct-arc furnace. It is more nearly comparable to the efficiency of the induction furnace which, since the source of its heat is in the resistance of the metal itself, does not heat its refractories to a temperature higher than that of the metal, and consequently enjoys the advantage of minimum radiation losses, as well as an utter absence of electrode heat losses. The high efficiency of the rocking furnace is primarily due to the fact that approximately four-fifths of the inner re-



THE DETROIT ELECTRIC ROCKING METAL MELTING FURNACE.

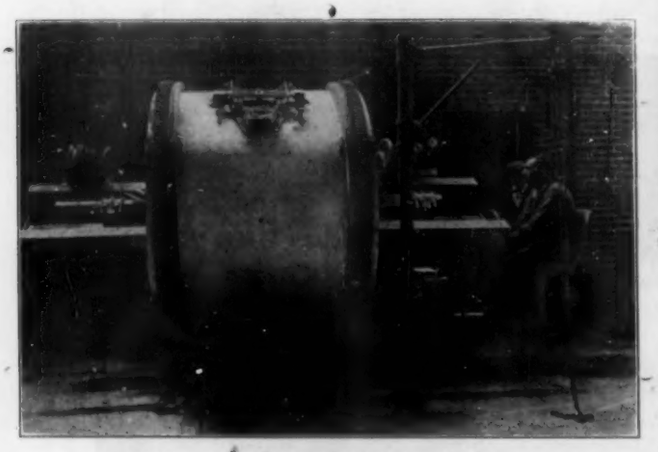
It is, of course, frequently very important to duplicate a complex alloy, for heat after heat, with a minimum deviation from the specified composition. Table II shows how exactly this can be done with the rocking furnace. The figures given in the table are taken, not from a special test, but from the routine analysis for thirteen consecutive heats from a rocking furnace melting phosphor bronze.

TABLE II.

Heat No.	% Cu	% Sn	% Pb	% Zn	% P
45	86.90	8.35	1.68	3.04	0.015

fractory lining is washed by molten metal, due to the rocking motion of the furnace. Most of that part of the lining which is exposed to direct radiation of heat from the arc, and thereby becomes hotter than the metal, is intermittently brought into contact with the latter and gives up its excess heat to the metal instead of expending it uselessly through the outer walls. The furnace losses under two per cent when melting very dirty borings and cuttings are by no means unusual this with metal which must ordinarily be melted in a reverberatory furnace, with complete loss of the volatile constituents of the alloy. Red borings, if not too dirty, can be melted with a loss practically as low as that experienced with clean red scrap or new metal.

The rocking furnace has introduced one decided innovation in brass foundry practice. With this furnace it is not only possible, but even highly desirable, to add



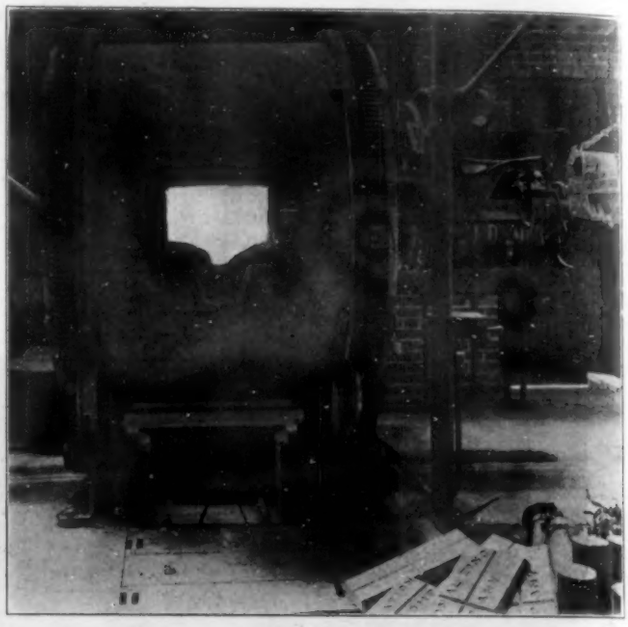
THE DETROIT FURNACE AT WOFK.

spelter with the rest of the charge at the beginning of the heat, when melting new metal or making up a deficiency of zinc in a scrap charge. This not only saves the time ordinarily consumed by the speltering operation, but also avoids the necessity of opening the furnace for this purpose, with the attendant loss of metal and heat. Tin and lead should also be added with the rest of the charge rather than at the end of the heat.

The excellent showing made by the rocking furnace, as compared with other types of arc furnaces, with respect to metal loss, is due to the rocking motion of the furnace, with the resultant agitation of the metal which eliminates all danger of local overheating of the charge.

The rocking feature of the furnace also plays an important part in prolonging the useful life of the refractory furnace lining. The continual washing to which most of the lining is subjected cools the refractories to a temperature only slightly above that of the metal itself, well below the critical temperature of the refractory brick used. The brick selected for this service is of such a nature that erosion by the constantly moving brick lasts for about 350 heats in average practice, at which time it requires more or less extensive patching. Under normal conditions, it is never necessary to entirely replace this inner lining, while the intermediate and outer linings ordinarily require no attention. One user of the furnace reports having obtained 600 heats from his first lining, on intermittent operation, and states that he expects to obtain from 900 to 1,100 heats on continuous operation. Under average conditions the refractory cost is less than 50 cents per ton of metal melted.

The electrode consumption is from 2 to 3 lbs. per ton of metal melted, or, at present prices, from 50 cents to 75 cents per ton of metal. This compares very



THE DETROIT FURNACE READY FOR CHARGING.

favorably with the best arc furnace practice in such installations as use the stationary type of arc furnace for melting copper alloys.

NUMBER OF AMPERES REQUIRED TO DEPOSIT 1 LB. OF METAL PER HOUR.

COPPER.—1 lb. of metal deposited per hour requires 386.4 amperes.

GOLD.—1 lb. of metal deposited per hour requires 185.8 amperes.

NICKEL.—1 lb. of metal deposited per hour requires 412.8 amperes.

SILVER.—1 lb. of metal deposited per hour requires 112.7 amperes.

ZINC.—1 lb. of metal deposited per hour requires 400 amperes.

The voltage or pressure required differs with the various metals. Thus:

VOLTAGE REQUIRED FOR PROPER DEPOSIT.

Brass	4 to 6 volts
Copper (Sulphate)	.5 to 1.5 volts
Copper (Cyanide)	3 to 5 volts
Gold	.5 to 4 volts
Silver	.5 to 1 volt
Zinc	3 to 5 volts
Nickel, at first 5 volts and diminishing to	1.5 to 2 volts

QUANTITY OF CURRENT FOR PROPER DEPOSIT.

	Amperes per sq. ft.
Brass	4.3 to 5
Copper, Typing, good solid deposit	14.4 to 36
Copper, Cyanide	2.9 to 4.3
Gold	.71 to 1.44
Silver	1.4 to 4.3
Nickel, begin with 9 to 10 amperes per 100 sq. ins., diminishing to 1.4 to 2.9.	
Zinc	10 to 20

N. B.—If solutions are agitated, the current density can be doubled, and in some cases trebled.

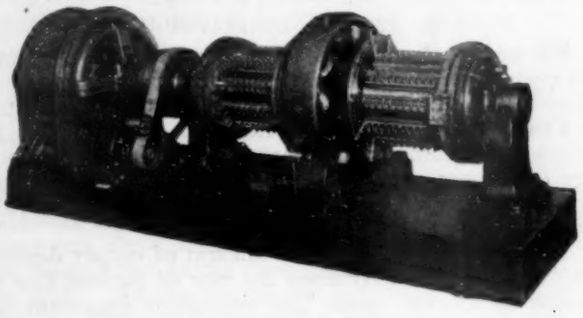
STANDARDIZATION OF GENERATORS FOR ELECTRO-TYPING

A Paper Read at the Eastern Divisional Meeting of the International Association of Electrotypers at Philadelphia, Pa., June 7, 1919.

By Floyd T. Taylor, General Manager of A. P. Manning Company, New York.

The object of this paper is to lay before you in a clear and concise way the problem of standardization and to lead up through a preliminary outline to the principal points to be considered in the standardization of a generator especially designed for the work of electrotyping.

Senator Lodge has very aptly said, "Beware of a closed mind." It is doubtful if any human investigation is more illuminating or better suited to open the closed



7,500-A., 6-V. "OPTIMUS" MOTOR GENERATOR.

mind than the arguments and considerations which properly lead up to the establishment of a recognized, stable and useful standard.

MEANING OF STANDARD.

We must first clearly establish our definition of the word "standard," around which this paper is to be moulded. The dictionary definition of the word "standard," used in this paper, is as follows:

"Any measure of extent, quantity, quality, or value established by law or by general consent, hence, any type, model, or example with which comparison may be made." A standardized article is stated as "having the accuracy or authority of a standard, serving as a gauge test, or model."

Now let us consider how a standard is established. It is established by collecting and classifying all the pertinent facts and by dividing these facts into two classes:

The first classification has to do entirely with the requirements of the case. The second classification has to do with the articles which are available, or which can reasonably be developed to serve as a standard or model. Such an investigation is no small matter, because in every investigation seeking to establish a real guide it will be found that a surprising number of conditions apply, many of which are not ordinarily considered or even recognized as affecting the results. All of the conditions must be weighed so that their relative importance can be determined and respected. The ultimate standard must not be expected to be perfection. It is important, however, to select for a standard the highest available type, and the reason for this is that in comparing with a standard the convenient gauge is the percentage gauge, and this to the human mind means a fractional comparison. For those who are especially interested in an account of the establishment of a standard, we would suggest the reading of the story of the determination of the international meter, which was accomplished in Paris in 1799. This standardization brought order out of chaos in the field of weights and measures.

BASIC LAWS OF ELECTROTYPING.

Is there any necessity for a standardized generator for electrotyping? To answer this question we must consider the three laws which are basic in electro-typing.

From the electro-chemical standpoint the foundation of electrotyping is expressed in Faraday's First Law, which states that "the quantity of an electrolyte decomposed by the passing of a current of electricity is directly proportional to the quantity of electricity which passes through it."

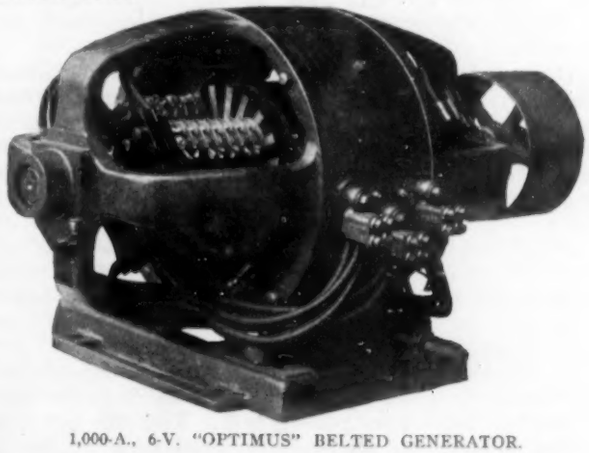
The second law which affects the electrotyper is Ohm's Law, which states that the current which will flow through any circuit is directly proportional to the voltage and inversely proportional to the resistance of the circuit. This law is customarily written, I equals

$$\frac{E}{R}$$

(I equals E divided by R).

The third law is the Watt's Loss Law, customarily written I^2R equals watts.

Those who are interested in the electro-chemistry of electro-typing should study these three laws until they have become living, real relations. They should not be thought of merely as pretty theories not entirely in accord with practical facts. Such a viewpoint of any law of science is out of order in these days and should be relegated to the limbo of the past, forgotten, and not to be resurrected.



1,000-A., 6-V. "OPTIMUS" BELTED GENERATOR.

Is there any necessity of understanding each other in ordinary conversation? If so, is it not of paramount and indisputable importance in these days when co-operative competition is the wise order of things to be able to comprehend the terms of the trade, order or class?

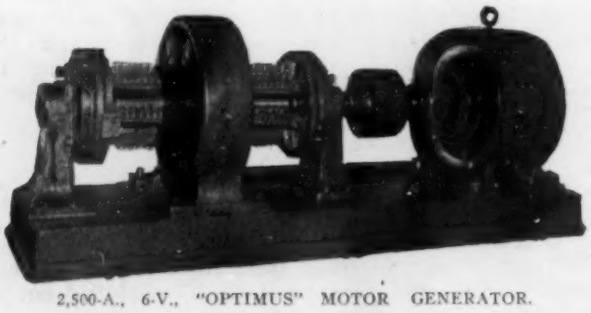
Just as the building of the Tower of Babel became an impossibility as soon as the confusion of tongue punishment was visited on the workers and their directors, so to the present time it has always been impossible to make any real advance until terms, tools and conditions have been identified, classified, understood and standardized. If any of you gentlemen have ever been bold enough to discuss costs, you know that the discussion has generally been of definitions rather than the determination of what are the actual factors that determine a cost estimate, and how are they to be combined into a reasonable cost estimate.

STANDARD GENERATORS.

Now consider what would be gained by establishing a standard electric generator for electro-typing; if nothing further were accomplished than the elimination of argument, it is our opinion that the establishment of a standard would be worth the trouble which it would take to do it.

You have plenty of things to talk about, plenty of elusive variables to consider and to control. Why not take so simple a piece of apparatus as a generator and establish a standard? The very establishment of the standard, as we have pointed out, involves a consideration of conditions and of the availables so that after the standard has been established, all argument concerning it is unnecessary.

The establishment of a standard would also give you a chance to compare the improvements in the art with an



2,500-A., 6-V., "OPTIMUS" MOTOR GENERATOR.

established gauge or guide. It would give you the certainty of at least average performance, because all of those having standard equipment would naturally be above the average, and those having inferior equipment must gradually improve in order to keep pace with their associates.

The standard generator would enable you to maintain fixed current relations in the circuits once they had been set for definite values. This is of paramount importance in these days of modern rapid electro-typing, when the electro-typers cannot control the amount of work done at one time so as to maintain an average load in their tanks.

A rush job is the "bete noire" of the electro-typer, and yet this "bete noire" can be reduced to a harmless animal as far as the electrical part of electro-typing is concerned, if the generator equipment will maintain its voltage regardless of load.

As you know, there is probably no one factor which affects the character of the deposit as much as the temperature of the copper plating bath. The only practical way of holding the temperature down to a reasonable limit, and of being sure that it is held down, is to adjust and maintain the rate of energy dissipated in the form of heat in the electrolyte itself. This heating is on account of the I^2R effect of the current and resistance of the electrolyte. The control of the I^2R heating is secured by having a generator in which the maintenance of voltage is independent of the current requirements of the electro-typing baths.

A standard generator will maintain its voltage regardless of the fluctuations of load to within one-half of one volt, and yet it is common knowledge that the ordinary electro-typing generator will vary as much as 60 per cent. in its voltage from no load to full load.

The definite and provable electrical efficiencies of a standard generator would prevent the electro-typer from being misled by absurd statements which are sometimes made regarding this important factor.

Let us consider for just a moment the converse of the question we have just discussed, that is, what would be lost by standardizing a generator for electro-typing? The answer is simple and is summed up into one word: nothing. The proof of the correctness of the answer is established by the fact that in no industry where there has been any true standardization, have the conditions been allowed to revert to the absolute chaos which maintained before the standards were established.

Let us assume that these remarks have made clear to you the meaning of a standard, the general way by which it is established, that we have proven the necessity for a standard generator for electro-typing, and we have amply illustrated the gain to be derived from the establishment of such a standard, and that we have convinced you that nothing would be lost by such procedure.

RATING A GENERATOR

We now outline the question of generator rating and give you briefly and concisely, the principal points to be considered in judging any form of electrolytic generator.

The three basic units of electrical measurement by which generators are rated are these: First, the amperage or current output at full load. Second, the voltage, and third, the wattage, that is, the product of the volts times the amperes.

The current determines the amount of copper deposited. The voltage determines the rate of current flow as shown by Ohm's Law. The wattage is important because the watt rating is the indication of the amount of energy that the generator will deliver to the electro-typing system and, of course, the whole electrical process of electro-typing is the turning of electrical energy into copper electro-types.

A proper generator speed is important because abnor-

5,000-A., 6-V. "OPTIMUS" ARMATURE.

mally high speeds cause excessive friction losses and make it difficult to commutate large currents.

The output of any generator is limited to two factors: first, heating, that is, the rise in temperature which must be kept below a point above which, deterioration of the insulation begins. If high grade insulations, such as mica and moulded materials, are used, the heating limits can be run up to a point which would be entirely unsatisfactory and unsafe if fibre were substituted. It is obvious that if the generator is permitted to get hot, it can be smaller and cheaper per watt output than if the temperature limits must be kept down.

The other consideration in connection with the rating of generators is that of delivering its full load without sparking or rapid deterioration of the brushes; the sparking factors depend upon the electro-magnetic features of the design.

The American Institute of Electrical Engineers have adopted a set of standard ratings of machines which would form an excellent starting point for the determination of the correct method of rating generators for electro-typing.

SELECTING THE STANDARD GENERATOR

Finally, we believe that the principal points to be considered in the selection of a standard generator for electro-typing are as follows:

First, efficiency because an efficient generator must be a good generator. The efficiency is thereupon the prime index of the operating characteristics of the machine as well as its economy.

Second, voltage regulation, that is a generator for electro-typing must be capable of maintaining its rated voltage over a wide variation of load.

Third, electrical balance or symmetry which prevents cross currents between the two ends of a double commutator machine and pulsating currents within the armature windings themselves.

Fourth, simplicity, that is, the elimination of unnecessary parts and windings so that the machine is easy of access, easy to understand, and easy to clean and inspect.

Fifth, commutator design, because the commutator is an exceedingly important part of the generator and a very expensive and difficult part to repair or renew.

Sixth, brushes of a type that do not require constant care to keep them from wearing ridges in the commutator, not too big individually, and not too many of them. There must be, however, a sufficient brush area to balance the electrical and friction losses, one against the other.

Seventh, brush-holders must be sturdy, without many or clumsy parts, self-aligning, and of such a design as to permit ready access to the commutator.

Eighth, insulation of mica, porcelain, and moulded materials, and electrical varnishes of the same character as would be used on high voltage machines for the purpose of protecting the vital parts of the generator from the fumes and vapors of the electro-typing room and from the possibility of trouble due to an external ground on the bus bar system. The fibre and paper insulations of ordinary plating generators are inadequate and improper.

THE ART OF ZINC PLATING

SOME INFORMATION REGARDING VARIOUS SOLUTIONS AND METHODS.

WRITTEN FOR THE METAL INDUSTRY BY T. C. EICHSTAEDT.

The process of zinc plating has its advantages over sherardizing and the hot dipping process in more ways than one and if the deposit is applied as it should be it will be found much better than either of the latter processes, and it can also be done a great deal more economically. The writer has had quite some experience in the use of this process. There are a few so-called patented zinc plating salts on the market and good results can be obtained with any one of them if the directions given are followed and adhered to, therefore I will not go into detail as to the preparation of solutions from such salts.

A good solution can be made up from zinc sulphate, aluminum sulphate and tin chloride, using proportions to suit the work in hand. Zinc cyanide solutions are being used quite successfully especially for articles having indentations, threads or deep recesses to be covered. The cyanide zinc solution however has not been successfully used on gray or cast iron, but it can be used very successfully on wrought iron, stampings and steel.

The principal difficulty in zinc plating is in preparing the work to be plated. The best method of cleaning small work that can be plated in the barrel is by means of a tumbling barrel. If the articles are covered with a scale, it is best to tumble them wet with a little nitre cake, then rinse and place directly in the plating barrel. A strong current of say about 15 to 20 volts should be used and the results will depend largely upon the nature of the articles to be plated, the strength of the solution and current. When it is necessary to plate in deep indentations or holes a much stronger solution and current than for plating ordinary articles is required.

As mentioned above the amount of deposit obtained depends on the strength of the solution and current and also the time and load. In some instances, it is more economical to run a small load than to run a full load in the barrel. Another factor to be taken into consideration is the anode surface. The anode surface should always be as large as possible as there cannot be too much anode surface in a barrel plating solution or in fact in any automatic plating tank.

Articles that cannot be plated in a barrel should be carefully arranged on racks or hooks so that they will not be shaded any more than can be prevented and whenever possible an automatic tank should be used. There are a few good makes of automatic tanks on the market and very good work is being accomplished with them. Of course, these automatic tanks have their advantages and disadvantages also and the articles to be zinc plated should be considered first in order to determine which tank will be most suitable for the work to be finished. This is by no means an easy proposition for concerns manufacturing these tanks will try to convince you that their particular tank is the one you should adopt for your kind of work.

The cleaning of articles to be zinc plated is also quite a problem. I have had quite a good deal of experience in the cleaning of such articles and as I have traveled a good deal and visited many establishments where zinc plating is being done I have had the opportunity to make a good many observations and I will endeavor to relate some of these observations here.

In one concern where architectural iron work is manufactured the plater encountered trouble in cleaning the parts for steel window frames. The parts were made of hot rolled steel and were drawn into shape before they were zinc plated, consequently they would be received in the plating department all covered with oil from the draw bench, also some fire scale. In order to remove the scale, the grease or oil had to first be removed, then the articles were pickled in muriatic acid or a nitre cake solution. The best way to remove the grease or oil is to use an electric cleaner and immerse the articles (if they cannot be tumbled) in either of these solutions for a minute or so. The electric cleaner should be used with current. The best cleaner for this purpose is made up of 8 ounces of caustic soda to each gallon of water, using a current of from 8 to 10 volts. After the articles are taken from the cleaner they should be rinsed in hot water and suspended in the pickle tank. They should not be thrown in the tank promiscuously but so arranged that they will not hang over each other. The time required for pickling varies according to the amount of scale to be removed and the strength and temperature of the pickle. The pickling solution should be used hot as it works much quicker.

The pickle can also be connected with electricity, a reverse current being used for this purpose with lead or carbon anodes. The scale can be removed in from one to five minutes, depending upon the amount of scale and the strength of the solution. Sulphuric acid can also be used very successfully with current, but will not give as good results as muriatic acid when used without electricity.

A hot cyanide zinc solution is the best for zinc plating

articles other than those of gray iron. The articles can be taken directly from the hot pickle or electric pickle, rinsed in hot water and then put directly in the zinc solution and left for 10 to 20 minutes, according to the shape the articles are in and the amount of deposit desired.

Articles that do not require pickling can be successfully cleaned and plated in a combination zinc electric cleaning solution and then transferred to a hot rinsing bath and finished in a regular cyanide plating solution or sulphate solution, whichever is preferable. I am doing this very thing every day and doing it successfully. The combination zinc solution is made up of 8 ounces of caustic soda and 2 ounces of soda ash per gallon of water and 5 pounds of cyanide and 15 pounds of zinc cyanide to a 150-gallon solution. An iron tank is being used for this solution with a few zinc anodes. It only requires an immersion of from 1 to 3 minutes in this strike solution to give a plate of sufficient thickness, and after the articles have all been covered in this strike solution they can easily be finished in from 15 to 20 minutes in a sulphate solution.

Automobile rims can and are being successfully cleaned and plated in a combination strike cleaning solution in 3 to 6 minutes after the scale has been removed. With the use of automatic apparatus the rims can be successfully handled in the pickle, rinsed, immersed in the zinc solution, rinsed and dried in 15 minutes' time, thus saving quite a good deal of time, labor and space. In fact when there is a large quantity of duplicate articles to be zinc-plated, there are automatic appliances that can be used for handling them. This is the day and age of automatic devices and apparatus. There is also a machine made for articles that can be successfully handled in a plating barrel which automaticlly cleans, rinses plates and dries them.

Attached to this machine is an automatic feeder and apparatus for carrying away the articles, which abolishes all manual labor. There is also an automatic plating machine made for finishing such articles as cannot be plated in barrels.

Although I did not have much experience with zinc solutions up until about two and a half years ago, I find that they are the easiest to handle and maintain of all the electro-plating solutions and have had excellent results in finishing quite a variety of work, especially ammunition parts, such as booster cases, adapters, fuse-parts, aeroplane parts, etc.

CASTING BRONZE UNDER PRESSURE.

A number of methods have been used for casting bronze under pressure, but none of them have proved very satisfactory from a commercial standpoint. The following methods are perhaps the most satisfactory.

1. Static pressure of a high gate. This plan has been used to some extent in casting aluminum bronze and similar alloys, in iron molds. The alloy is melted in a small crucible, say No. 10, the molds poured, and if not numerous enough to take the contents of the crucible, it is returned to the melting furnace until the castings are removed and the molds are again ready. The high gate is satisfactory for certain classes of work. It does not give much pressure, however, requires very hot metal and produces considerable scrap owing to the size of the gate.

2. The molten bronze has been poured into a cylinder of cast iron, lined with sheet asbestos and connected with the mold by means of an asbestos thimble. After pouring the bronze into the cylinder, a circle of sheet asbestos is laid upon it and pressure applied by a piston through a hand lever. Considerable pressure may be had in this way and very intricate castings have thus been made, the outlines being reproduced with the greatest fidelity. The molds are made of a plaster composition, and cannot be used a second time. This fact and the small production possible has limited the commercial use of this method.

3. A centrifugal casting apparatus has had some vogue for bronze. This method has been used commercially for making hollow cylinders of considerable diameter and length. A cylindrical mold suitably lined is revolved at a high rate of speed. One end of the mold is only partly closed, the opening therein being large enough to admit the insertion of the casting. When the mold is up to speed, the arm carrying the ladle is rotated and the metal flows, through the influence of the centrifugal force due to the speed of rotation, over the surface of the mold to form a cylinder. The thickness of the walls of the cylinder can be regulated by the amount of metal in the ladle. It is possible to make cylinders 20 feet long and several feet in diameter by this method. The method produces chilled bronze castings which should have a maximum strength. Unfortunately it is difficult in practice to stop the rotation of the mold at the exact moment when the metal has commenced to shrink rapidly. Hence the force due to the shrinkage of the castings bucks the centrifugal force and the casting is weakened by hair-cracks or it may be actually broken. Centrifugal casting has been used for a long time by dentists. It has recently been the subject of an application patent for the casting of aluminum alloy induction motors, both the bars and end rings being cast at one operation, with some measure of success. It is claimed that small bronze bearings are now being cast centrifugally, the molds being poured vertically and then rotated horizontally.

It is doubted that the pressure castings of bronze by the centrifugal method will ever have any very wide or successful commercial application.

4. In the die casting of bronze and other high melting point alloys, pressure has been applied to the surface of the molten metal, thus forcing it into the mold. The flow of the metal into the mold may be aided by applying a vacuum to the mold. Numerous practical difficulties have been encountered in using this method, but the die casting of bronze will be along the line of some modi- writer is inclined to believe that future progress in the fication of this method. J. L. J.

BRASS PATTERN MIXTURES.

A good mixture for brass patterns is the following: Copper 84, tin 3, lead 3, zinc 10. It can be readily scraped, casts well and solders well but for thin patterns it may not hold its shape as well as hadder, stiffer alloy.

The light aluminum alloys leave little to be desired where no soldering has to be done on patterns. By the use of a low melting point aluminum solder like Richards', the average pattern maker will have no great difficulty in making very good joints. A good ally for aluminum patterns is composed of aluminum 72, copper 2, zinc 15.5 and manganese 0.5.

An alloy composed of equal parts of tin and zinc is one of the best that can be recommended for pattern plate work. A little rapping of the pattern will bring out the castings with practically no shrinkage. This alloy is easily soldered. It has the defect, however, that it loses its shape when cast in thin sections and subjected to rough usage.—J. L. J.

MODERN DEVELOPMENTS IN DIE CASTING.

A Description of the Plant of the Doehler Die-Casting Company.

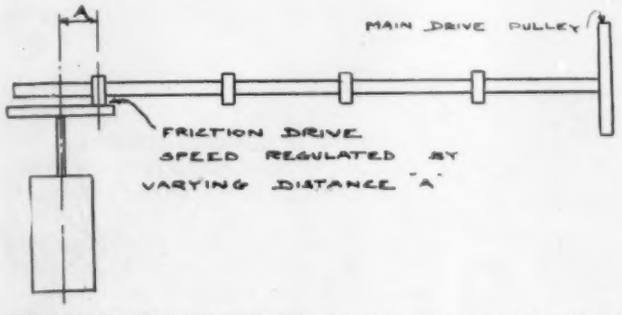
Written for The Metal Industry by Adolph Bregman, Metallurgical Engineer.

The New York plant of this company is housed in a ten-story building of steel and concrete. It is laid out so that each floor or set of floors comprises a complete unit of the plant and fulfills a function of its own.

In the basement is the metal stockroom, where bars and ingots of raw materials are kept. These metals are received and stored there until such time as they are needed. It is the policy of the company to use none but absolutely new and unused metals. It has been found that this works for economy and smoothness of operation. This is not merely a theory but the result of actual experience. On this floor there is also a room for storage of dies.

In another part of the basement is a gas producing plant which supplies gas for all the metal alloying and heat-treating purposes, and for laboratory uses.

On the ground floor are the receiving, shipping and alloying departments and an excellent first aid room, fitted with all modern appliances. Raw material of all sorts are received and sent to the storage room in the basement by means of chutes. From these chutes the



SKETCH SHOWING ARRANGEMENT OF REVOLVING CATHODE FOR ELECTROLYTIC ANALYSIS.

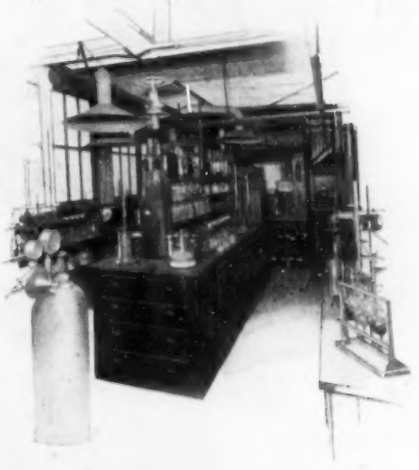
material is taken to assigned places in the storage rooms and kept there until required. The metals are tested and analyzed before being alloyed. After they have been made up into standard alloys, they are returned to the storage rooms and kept until required by the Casting department. In this way, it is made certain that no material is used in the casting machine which is not correct in every detail.

The alloying room consists of a number of cast iron kettles of 7,500 pounds capacity, gas-fired and covered by sheet iron hoods which are connected to exhaust flues for carrying off objectionable and injurious vapors. These kettles are lined up along the walls of the room, thus leaving the center clear for passage of men and materials to and from the furnaces. There is also an air supply main, which runs around the room at a height of about ten feet. From this main, leaders are taken, through which cool air is forced so that it will blow directly on the men as they work at the kettles. By means of this system of exhaust and supply flues, the men work at an even temperature in perfect comfort and safety.

A reverberatory furnace, gas-fired, is being installed for melting and alloying aluminum; it is hoped that this will replace a number of kettles. The objection to the use of kettles as they are operated now is that the aluminum corrodes the cast-iron so rapidly that the life of the kettle is only a few months. The furnace, being lined with alundum brick, is expected to withstand the corrosive action of the aluminum, and as it has a much greater capacity than any of the kettles, to cut down to a large extent the labor used in this department.

From the inspection room the finished castings are sent to the shipping room where they are packed and sent off.

On the second floor are the offices and engineering rooms. A few words must be said about the Engineering department, which is unquestionably one of the most important in the organization. It is composed of a chief engineer, a chief draftsman and their staff of men who have had wide experience in the designing of dies for die-casting, and in estimating. The peculiarities inherent in this field call for specialization, and the knowledge of details can be gained only from experience in this field. Errors in the Engineering department imme-



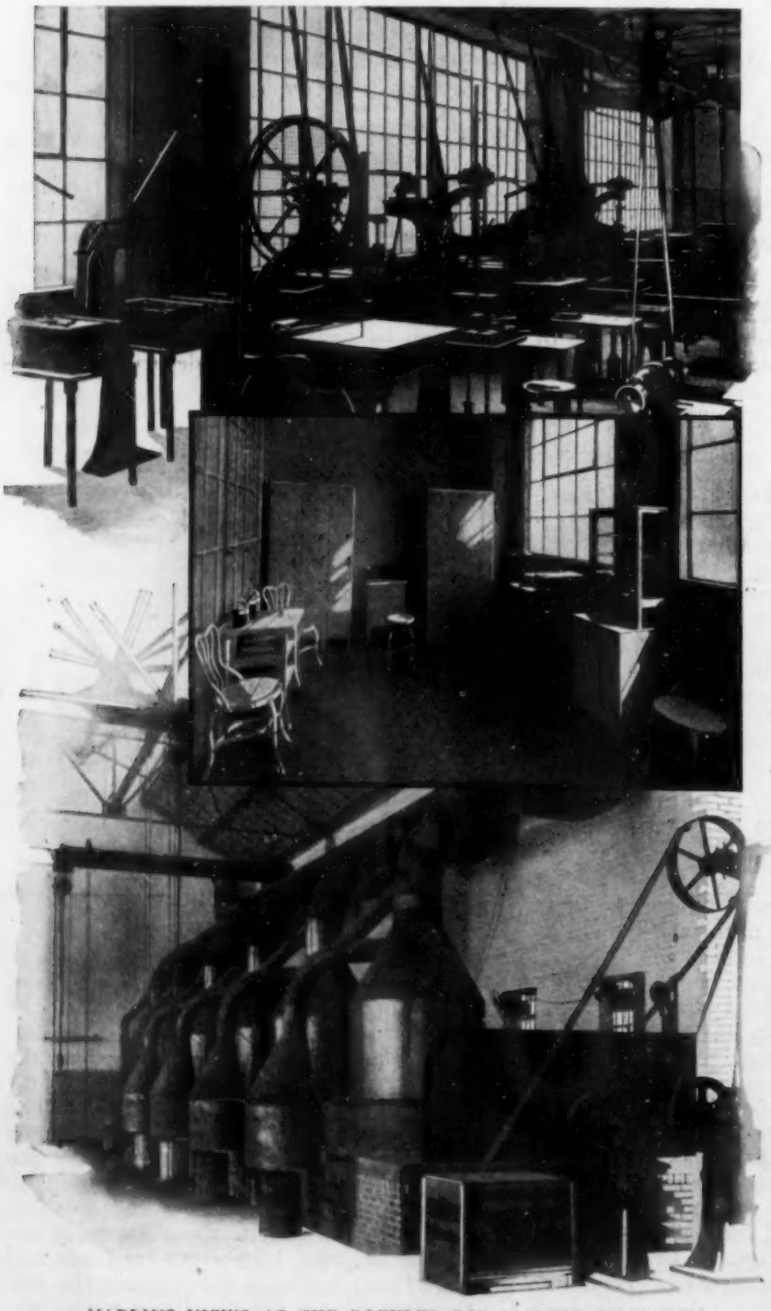
THE CHEMICAL LABORATORY AT THE DOEHLER PLANT.

diately make themselves felt throughout the entire plant, and very careful supervision and checking must be exercised to avoid them.

The third floor is taken up by the machine shop, the die room and the heat-treating room. On the fourth floor is the cleaning and finishing department. The castings, as they come from the machines, have numerous fins and burrs, which must be removed before they can be passed. Most of these defects can be removed by hand-filing, but in some cases machining and finishing are necessary. On the fifth floor is the white metal department. Here the tin, zinc, lead alloys are made and cast into ingots. There is also a lunch room for employees. On the sixth floor is the aluminum casting department, and on the seventh floor are the chemical and physical testing rooms.

The chemical laboratory is particularly noteworthy in that its arrangement is so novel. The work tables are placed around the walls, and the hoods in the center of the room, in such position that the chemist need only turn around to place producers of poisonous or noxious fumes where they are harmless. In other words, it is less trouble, under this arrangement, to be safe—and it is obvious that such a provision makes safety general. It is good applied psychology.

The electrolytic department is so arranged that every cathode revolves at any desired speed, by means of a simple adjustment from a single horizontal driving shaft. This shaft actuates the vertical shafts which hold the cathodes, by friction with discs which are fastened to and centered on the vertical shafts. These discs can be driven at different speeds by simply varying the radius at which the disc takes its friction from the horizontal shaft. (A sketch shows this arrangement, which was installed at the suggestion of Mr. J. L. Jones of the Westinghouse Electric Co. by Mr. Charles Pack, Chief Chemist of the Doehler Die Casting Co.)



VARIOUS VIEWS AT THE DOEHLER DIE CASTING COMPANY'S PLANT, BROOKLYN, N. Y.

The eighth, ninth and tenth floors are taken up by the brass casting department which produces the Do-Di brass castings. This process is now being developed and cannot be discussed in this paper due to the fact that patents on it are now pending in the patent office of this and foreign countries.

TYPES AND AMOUNT OF METAL USED.

	Pounds per Month
1. Copper, electrolytic	300,000
2. Zinc—Brass Special Spelter	400,000
3. Tin, American Smelting & Refining Co., electrolytic	300,000
4. Lead, desilverized	100,000
5. Aluminum Company of America	250,000
6. Antimony	50,000

Before the war Cookson's Antimony was used, but as this is now almost impossible to obtain, Japanese Antimony serves the purpose.

ALLOYS

Twenty-five standards are put out by this company. Other mixtures can be made to suit the requirements of the casting. Some of these mixtures are as follows:

1—Zinc, 88 per cent; Tin, 8 per cent; Copper, 4 per cent.

This alloy is almost as strong as cast-iron, non-magnetic, and polishes readily but does not hold its polish unless it is lacquered. It can be easily electroplated by standard methods, enameled with any celluloid enamel, or hot enamelled below 275 degrees F. It is not best to use this alloy under conditions which require a temperature over 100 degrees. It is easily dissolved by mineral acids and alkali, and corroded by water. It should be protected by a coat of non-corrosive metal or some enamel.

2—Tin, 86 per cent; Copper, 6 per cent; Antimony, 8 per cent.

This is essentially a bearing metal, and of the type that is popularly known as "Genuine Babbitt." Its tensile strength is of course low, but it is used in places where tensile strength is not required. It takes a polish and keeps its finish under normal conditions. It is very slightly corroded by mineral acids and alkalies; does not melt below 425 degrees F., and is not at all affected by water or organic acids, so it is used to a great extent in food containers.

3. Lead.....83%
Antimony..17%

This is used for a number of purposes, such as bearings, where the speed and pressure are not too high. It melts at 600° F. It is insoluble in diluted sulphuric acid and nitric acid, and slightly soluble hydrochloric acid. It cannot be used as a food container as it forms poisonous salts with organic acids.

4.	Aluminum .92% Copper 8%	The tensile strength is very high—21,500 per sq. inch, the elongation is about 1½%. The copper contents can be varied to the extent desired so so as to obtain the desired tensile strength and elongation; melting point—1150° F. This alloy is well adapted for food containers. It is insoluble in nitric acid and although soluble in organic acids, the products are not injurious.

The dies for aluminum casting, are made of type "D" Chrome Vanadium Steel of about the following composition:

C	.5
Cr	1.0
V	.2
Mn	.9

For white metal casting, machine steel is used containing about .12% carbon.

PRINCIPLES OF DIE-CASTING.

The three important features to be looked for in Die-Casting, are:

1. Strength.
2. Accuracy.
3. Uniformity.

These are obtained as follows:

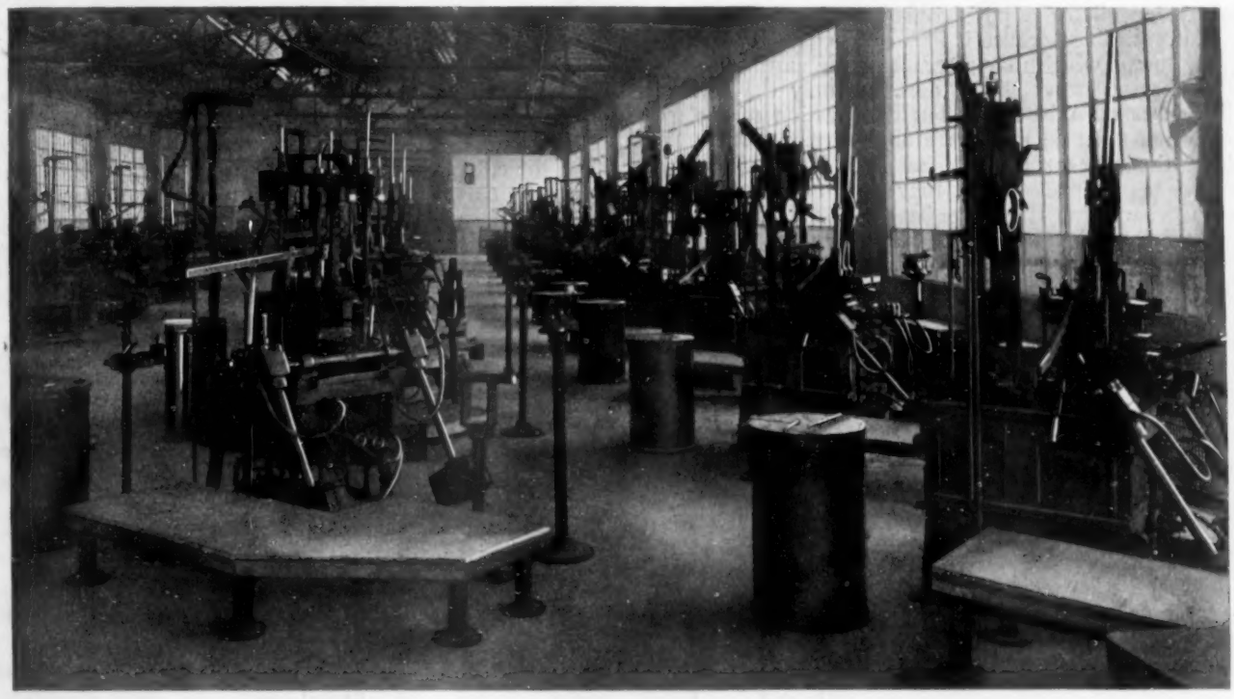
1. Accurate designing of the casting.
2. Use of high-grade metals.
3. Proper alloying.
4. Close checking of castings to detect any approaching inaccuracy.
5. By obtaining a close grain.

The proper designing is entirely in the hands of the engineer who must so design the casting that it will be reinforced in points of strain; that it will be extra thick and heavy, and perhaps even have bushings of steel or bronze where there is excessive wear.

The best way to be sure of the metals used is to buy new, or virgin materials. It is possible, of course, to assure by proper testing, the use of correct scrap metals but it has been found more economical in point of labor saving, elimination of considerable extra testing and analyses, and avoidance of troubles and breakdowns to use standard grades of new metals.

The alloying should be done under the supervision of chemists.

To avoid segregation, and to obtain a close grain, it is necessary to obtain the proper temperature. If the metal is too hot, it will "shrink" or "crowd" away from the die, and leave surface blisters and "pipes." If too cold, it will cool before it completely fills the die, and



THE DIE CASTING ROOM AT THE PLANT OF THE DOEHLER DIE CASTING COMPANY, BROOKLYN, N. Y.

show flow lines and large interior spaces. Roughly, it can be stated that a temperature of about 40°-50° F. above the melting point is the best, but this should not be applied too generally or be taken too literally. Each new mixture must be tested.

Accuracy:

1. Correct dimensions of the die.
2. Correct calculation of shrinkages.
3. Correct temperature of die.
4. Close checking of castings to detect any approaching inaccuracy.

The first two precautions are in the hands of the engineering department entirely. The temperature of the die is controlled by proper water cooling, and must be carefully watched. The checking of course, must be done by inspectors, by means of very accurate gauges.

Uniformity:

This is a general term which includes almost all other specifications. It can be judged by measurements and by weighing, so as to detect inner defects. The only way of assuring the production of uniform castings is

to have uniform working conditions under which these castings are produced.

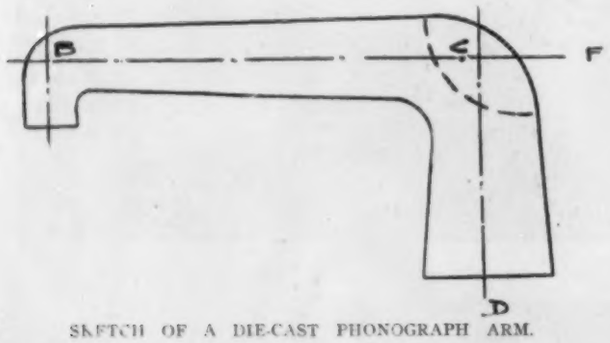
The machines are operated by compressed air; the metal heated by gas; the dies are water cooled. A detail of the Doehler type of die-casting machine was shown in an article by Charles Pack of that company in THE METAL INDUSTRY of March, 1918. This machine uses air at 300 pounds pressure.

DETAILS OF DIE-CASTING.

In order to avoid blow-holes, pipes, blisters, cold sets and run marks (or flow lines) it is most important to have both the metal and the die at the proper temperature, and to keep the metal at that temperature during its period of flow, that is, until the die is completely filled. In order to facilitate this, the faces of the dies are painted with a thin coat of some heat insulator such as powdered talc mixed with gasolene (to form a thin paint), or oil, or a powdered clay wash. The last is not so desirable because it has a tendency to form small gritty lumps which mar the face of the casting.

In the designing of the dies, not only the shrinkage allowances must be made, but the location of the gates and vents must be most carefully planned. In the first place, the gates should be as small as possible; they should be so placed that they will not show on the finished part after they have been filed off. It is obvious that no general rules can be laid down for this. Each case has its own peculiarities and calls for special consideration.

Vents are, of course, indispensable. The air in the die must be given an avenue of escape; there are pockets in every casting. To a certain extent, the space between the faces of the dies, which always exists, no matter how accurately they are machined, may act as such, but this



SKETCH OF A DIE-CAST PHONOGRAPH ARM.

cannot be figured on, as it is almost always cut down to an irreducible minimum. Sometimes, fin spaces are left for this purpose, however; also, the spaces left by ejector pins act to some extent as vents. Some definite provision must be made, however. A general figure for the thickness of vents is from .005 to .01 inch.

The prevention of the blow holes cannot be effected by any one method. There is no cure-all for defective casting. The temperature of the metal, the temperature of the dies, proper gating and venting, and sufficient pressure on the metal must be maintained. Large dies must be water cooled; small ones often cool too quickly. The proper temperature of the metal can be deduced from the condition or appearance of the defective casting. Cold metal will show cracks, large open holes and run marks, showing a seemingly laminated structure on the surface. Hot metal will cause a poor surface, porosity and sponginess.

It is noteworthy that a peculiarly hard type of casting to make is the simple billet of more than ¾ inch diameter. There is always a very strong tendency toward "piping," or leaving a long cylindrical hole down the center. Wherever possible, it is advisable to design this type of casting with a hollow core.

Among the special features, one of the most important is the ingenuity required in locating and removing cores. One example of this is thedie with 365 incerts. Others are the phonograph horn with its two bends, and the part of a piano player with a curved core. Perhaps a short explanation might not go amiss.

In the phonograph horn, one core is set along line AB, another along BCF, and a third along CD. From the sketch it is evident that a hole (as shown by the dotted curve line) is left around point C, after the piece has been cast and the cores withdrawn. In order to close this, a new core is inserted along CD, a plate cast over the hole, which, while filling the open hole melts the edges around it by its own heat, and forms a perfect weld in casting. This place is specially buffed and polished, and is very hard to distinguish from the other parts of the horn. This method of making double bend elbows is covered by patents controlled by the Doehler Die Casting Co.

The curved tube is of course easy to place and cast. The difficulty lies in withdrawing the core without marring the casting. This was overcome by using a rack and pinion arrangement, the rack being on the core itself, outside the part which was to be cast around, and curved at the same radius as the main part of the core. The pinion was applied after the casting was made, and the curved core screwed out of the casting.

SUMMARIES.

To recapitulate briefly the three qualities required of a good die casting are:

(1) Strength.
(2) Accuracy.
(3) Uniformity.

These depend upon the following:

(1) Dies.
  1. Composition.
  2. Design.
    a. Cores.
    b. Gates.
    c. Vents.
    d. Shrinkage.
    e. Ribs and bushings.
  3. Temperature.
    a. Water cooling, for large dies.
  4. Accurate construction.

(2) Metal.
  1. Clean or new metals only.
  2. Correct composition or alloying.
  3. Temperature.
  4. Pressure.

(3) Machine.
  1. Automatic operation.
  2. Uniform conditions at all times.

FARRADAY'S LAWS OF ELECTROLYSIS.

To Melt Aluminum Foil.—For melting "aluminum foil" proceed as in melting fine aluminum turnings. First prepare a bath of molten aluminum, preferable in an open flame furnace; although a crucible may be used. Into this bath work in this foil by the operation known as puddling. The temperatures of the metal should be kept low and a flux of zinc chloride, sal ammoniac, chloride of lime, etc., should be used, not as a reducing agent, but to allow the molten particles of the alloy unite. Pour into ingots, analyze and use product where the analysis shows it can best be used.—J. L. J.

EDITORIAL

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CONTENTS

THE ELECTRO-PLATERS' CONVENTION

Another electro-platers' convention has passed into history, and at the same time has made history. The results of the sessions held at Philadelphia during the first three days of July spell progress, and the platers are to be commended for the advance they have made. As Mr. Hogaboom says in his résumé of ten years of the society which we publish in this issue of THE METAL INDUSTRY, perhaps the greatest progress made during the life of the society is the decision to allow publicity for their technical deliberations. Now the society will be doing a real service in adding to the literature concerning the art of electro-plating for its publication will probably now be available for filing in libraries, etc. The American Electro-Platers' Society will be able to take its place with the other great technical societies, and will soon be looked upon as an authority in its chosen field.

Another opportunity for this society to advance is mentioned by MR. HOGABOOM, and was urged several years ago by THE METAL INDUSTRY. This is the opening of the society to others than foreman platers and members of plater supply houses. The constitution could easily be amended so as to read "The Society is open for membership to those interested in the art of the electro-deposition and finishing of metals." This would enable the assistant plater or casual plater to enjoy the advantages of the society and so improve himself that he would more rapidly become proficient in the art.

The plea made by DR. BLUM of the Bureau of Standards for some method by means of which funds could be raised for the Bureau to carry on its work of investigation should meet with approval. We have no doubt but that the committee appointed by PRESIDENT FRAINE will devise a plan which will receive the substantial support of all interested in the advancement of the art of finishing metals. We are sure that there is no more deserving work than that which the members of the American Electro-Platers' Society have pledged themselves to do:—The lifting of the veil of mystery from around the plating tank and turning the searchlight of investigation into the darkest corners.

So the Electro-Platers' Convention has done much, and no one who attended it went away without having gained a lot and feeling satisfied that he had gone to it and with his mind fully made up to do his best to aid in the work for the coming year, so as to be able to report still more progress at Rochester, New York, in July, 1920.

SPELTER IS ZINC

The recent action by the American Zinc Institute in deciding to call slabs of zinc metal commonly known to the trade as spelter by their right name of zinc is one which will meet with the approval of all interested. We explained back in March, 1915, that there was no warrant for calling zinc zinc when in one form and "spelter" when in another. As we told then the word spelter was probably derived from the Belgian word "spiauter," meaning to fume. The term was undoubtedly applied to the metal zinc which fumed or oxidized when melted, and this probably was because zinc was the only metal known to the early Belgians which had this characteristic. As a matter of fact cadmium, antimony, bismuth, and arsenic also "spiauter" or fume, so they might with equal right be called spelter!

The decision of the Institute also to designate the material known as "galvanized" iron by the name of zinc is also to be approved. We have repeatedly called attention to the fact that the word "galvanizing" is not a proper name for hot or cold zinc plating. Now that iron or steel coated with zinc is to be called zinc plate or zinc plated we hope to see the words "hot galvanizing" and electro-galvanizing disappear from the metal world except where they can be rightly used.

We are glad that this step has been taken, and we congratulate the Zinc Syndicate for coming to the solemn conclusion that zinc is zinc.

We are anxiously awaiting now for word from those most interested that the term nickel silver will be abolished, as we advocated in March, 1917, and the mixtures of copper, nickel and zinc will be given their proper place in metallurgical nomenclature. These compounds should be called—five,ten, fifteen, eighteen, twenty or twenty-five per cent. nickel alloy or simply so much per cent. nickel!

CORRESPONDENCE AND DISCUSSION

While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

HOW TO ADVERTISE—A BUYER'S VIEW

To the Editor of The Metal Industry:

I have just replied to an inquiry as to where japanning barrels are made. I wonder if you could induce the manufacturers of this article to advertise in The Metal Industry.

George P. Butler,
Metals Finishing Company.

Hamilton, Canada, May 31, 1919.

George P. Butler,
Hamilton Canada.

Sir: We enclose the names of several concerns that manufacture japanning barrels who already advertise in The Metal Industry. All of them make the regular oblique barrels for this purpose.

The Metal Industry.

New York, N. Y., June 3, 1919.

To the Editor of The Metal Industry:

Yours June 3rd. The inquiry was general. It is impossible to tell from the ads whether or not japanning barrels are included. Tumbling barrels are associated with foundry castings. Advertising should be Specific. In this instance the barrels should be described as are the various plating barrels, and let me tell you the japanning barrel is no longer "small potatoes," it's cutting a big figure; for instance, the cheap articles found in the Woolworth stores are barrel coated, and vast quantities of small metal articles are thus treated. We are entering a new age, the liberal advertiser will be King, but he must be specific, if he tries to economize in space by crowding all his products under one head he confuses the buyer.

George P. Butler,
Metals Finishing Company.

Hamilton, Canada, June 4, 1919.

To the Editor of The Metal Industry:

My letter was not written for publication, but you can make it as strong as you wish. Yesterday I was in the office of a big concern at Buffalo and the superintendent, two foremen, buyer and manager were selecting data for some new machinery. Did they have catalogs before them. They did not, But—trade papers were placed on the table and selections were being made from descriptions and cuts in those papers. That's the modern, up-to-the-minute method. Notice the full page ads of city merchants, descriptions follow every item. The trade paper is the manager's medium of selection, and the ad to be effective must be specific.

George P. Butler,
Metals Finishing Company.

Hamilton, Canada, June 12, 1919.

NEVER TOO OLD TO LEARN

To the Editor of The Metal Industry:

I would like to subscribe for The Metal Industry once more. It has been a good many years since I read your paper, and undoubtedly I may learn something, as a man is never too old to learn.

Still I know some platers—"would be" consulting platers—around Seattle, Wash., and Los Angeles and San Francisco, Cal., who claim The Metal Industry is all right for boys who want to learn. Nevertheless, while up in Seattle last January, I came in contact with these consulting platers, and not one of them could make a black nickel solution. They can make steel solutions, arsenic black, etc., but I never found a plater who could make a black nickel solution with sodium sulphocyanide. Still they are going about calling men "book-platers" if they read The Metal Industry.

John F. Fleckenstein.

Chicago Heights, Ill.,
May 24, 1919.

NEW BOOK

Principles of Foreign Trade.—By Norbert Savay. 6¼ by 8¼ inches. 495 pages including an appendix and index. Bound in cloth. Published by the Ronald Press Company. Price $4.00. or sale by THE METAL INDUSTRY.

This book covers every phase of the exacting subject of principles of foreign trade with clearness and thoroughness,—investigating, selecting, and training representatives, selling, shipping, insuring, financing and collecting. It also gives tables, lists, charts, texts of commercial laws, bibliography, trade customs abroad and a fund of valuable information never before assembled in one volume. The primary aim of the book is to set forth those general principles which underlie the building up of foreign trade, not merely of such trade as is a convenient outlet for a few superfluous home products, but as a part of a permanent and national foreign trade policy. The book is made up in five parts, together with an appendix. The subjects treated in these parts are:—first, General Considerations; second, Machinery of Foreign Trade; third, Operating a Foreign Trade Organization; fourth, The Technique of Foreign Trade, and fifth, Trade Regulations.

In view of the rapidly increasing opportunities for foreign trade this book is indeed timely, and we have no doubt will prove of great value to manufacturers and producers of the United States who, if they are not now, will certainly be later on, interested in foreign trade. We also have no doubt but that this work will prove to be a great help to concerns now engaged in foreign trade and also to those who may wish to be placed in touch with inside information.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating-Chemical

ALLOYING

Q.—I would appreciate your advice as to making an alloy consisting of 83 1/3 lead, 8 1/3 copper and 8 1/3 antimony.

A.—The alloy of 83 1/3 lead, 8 1/3 tin and 8 1/3 antimony has been used to a considerable extent as a babbitt, although it is rather soft. It is known as the "United States Metallic Packing" formula. If you had this formula in mind, no especial instructions are needed in regard to its manufacture. The slabs of antimony are broken up into approximately five-pound pieces, placed in the bottom of the cast iron kettle and the pigs of lead are placed around the outside of the kettle. Allow to melt over night, stir well and add the tin again stirring.

The writer is not familiar with the exact formula which you give, however, and doubts if it would be practicable. Where babbit is made from antimonial lead containing several per cent of copper, it is sluggish, drossy and unsatisfactory. Usually not over ½ per cent. of copper is found in a lead base babbitt and its presence even then may be accidental. If it is desired to make the above alloy, melt the copper and antimony together, thus forming an intermediate alloy. Pour into ingots. Remelt and pour into the lead which has been separately melted and made very hot.—J. L. J. Problem 2,717.

Q.—Could you furnish me with the formula of a cheap white metal with a melting point of 900 degrees to 1000 degrees Fahr., or higher if possible? The metal is to be used for piston ring packing where super-heated steam is used. At the present time our customer is using an alloy of 50 per cent. lead and 50 per cent. copper, but they have had difficulty in manufacturing same. What they want to purchase, if possible, is a white metal alloy that will cost less than 22 cents per pound, that will flow freely, and that can be cast in a chilled steel mold.

A.—Attempts have been made to use the zinc base babbitts and die casting alloys for piston ring packings for superheated steam. These alloys, even when high in tin, have proved unsatisfactory. They oxidized rapidly and their melting points were much below the 900 degress Fahr. which you specify.

The alloy of copper and lead which you mention is the only one with which the writer is familiar that is satisfactory for such packings. The United States Government specifies that it shall have a Brinell hardness of 24 to 32 and contain from 38 to 41 per cent. of lead. While this alloy is difficult to produce with a uniform degree of hardness, it can be done by using a mixture of copper 60, lead 40, and stick sulphur 1. The sulphur is introduced by means of a phosphorizer. Chalcopgrite or galena has been used instead of the stick sulphur. According to another formula, nickel is used to prevent the separation of the copper and lead. Careful melting is essential, and a flux composed of 2 pounds of plaster of paris and 4 ounces of borax to 100 pounds of metal may be used.

It is the custom of some foundries to cast this alloy into pots that can be cut up into four or more rings, but the best results are obtained from using rings cast in gree sand molds. The 60 copper, 40 lead alloy has a melting point of about 1,400 degrees Fahr.—J. L. J. Problem 2,718.

CEMENTING

Q.—We are manufacturing pearl handle cutlery and stag carving sets. Up to date we have been using cement and we find that the blades come out, after a little use. Can you give us any information as to how to remedy this?

A.—"V" indentations or an indentation of a spiral nature should be made upon the shank as this method gives a great clinging surface to the cement. A white cement that has unusual tenacity is prepared as follows:

Finely powdered glass	5 parts by weight
Powdered borax	4 parts by weight
Silicic acid	8 parts by weight
Zinc oxide	200 parts by weight

The mixture should be as fine as possible and thoroughly mixed. Then prepare a concentrated solution of zinc chloride in water and mix with the cement to produce a fluid cement. This cement a short time after applying will set as hard as marble.

The litharge and glycerine cement makes an excellent combination. Mix litharge with pure glycerine to a fluid paste and use in the customary manner. A cement that is nearly white and which has great binding power and which is also unacted upon by water is prepared from a mixture of oxide magnesium and water. The cement should be used fluid.—C. H. P. Problem 2,719.

DEPOSITING

Q.—I wish to obtain some very thin nickel sheets by plating nickel on a fairly heavy copper sheet and then stripping the nickel deposit from the copper sheet. I have encountered trouble from the nickel deposit sticking on account of the stripping solution not working and also from the nickel getting over the edges and clinging to same. Can you refer me to some material which will act as a stripping solution. Also a material which can be applied to the edges of the copper sheet to prevent the nickel depositing there.

I would also like a formula for a nickel solution that will give a soft deposit.

A.—Potassium iodide has been found to be a very efficient material to use as a medium for coating a metal on which another metal is to be deposited and later removed. A thin coating of the potassium iodide should be applied to the copper sheets by means of a soft brush or the material should be flowed over the copper surface.

The edges of the copper sheet should be coated with an air drying asphaltum varnish which will prevent the over-lapping of the deposit of nickel.

A very soft nickel deposit can be obtained from the following solution.

Water	1 gallon
Single nickel salts	6 ounces
Double nickel salts.....	2 ounces
Sodium citrate	2 ounces
Boracic acid	1 ounce

The solution should be used with 2 volts and the current must be low to avoid the burning of the deposit.—C. H. P. Problem 2,720.

ETCHING

Q.—Could you give me the formula for the etching paste which is used for making prints on etching paper to transfer on steel articles for the purpose of etching. I believe it is made of bees' wax, venice turpentine and lamp black.

A.—Black printers' ink is used as an etching ink or paste. This ink is also termed thick ink. You can prepare such an ink yourself by using the following materials.

Rosin	8 ounces
Lard oil	1 tablespoonful
Lamp black	2 tablespoonfuls
Venice turpentine	1 tablespoonful

Prepare by first melting the rosin, then add the lard oil, Venice turpentine and lamp black and mix thoroughly. When cold the material should look like ordinary thick printers' ink. If it is found to be too thick it can be reduced slightly with ordinary spirits of turpentine.—C. H. P. Problem 2,721.

FINISHING

Q.—Can you tell us what is the finish on the sample which we have sent under separate cover?

A.—The finish on your sample is what is known as an Aurelia Finish, and is produced in the following manner:

The brass parts should be first satin finished, and this may be accomplished by using an acid dip, scratching brushing or sand blast. The sample appears to be finished by the steel satin finish scratch brush. In some cases after sand blasting, the parts to be gold colored are cut down as usual with tripoli composition. Then washed to remove the dirt and dried out, and finally gold lacquered. The sand blasted surface produces more of an olive green finish.

In order to produce the brown tone after satin finishing, clean and immerse in a solution consisting of

Water	1 gallon
Polysulphide	4 ounces

Use this solution at a temperature of 180 degrees Fahr., and after immersing the articles in it for a moment or two, remove them, wash in water, immerse in a cold dip consisting of 1 gallon of water and 6 ounces of copper sulphate for a moment, then remove, wash an dry and scratch brush lightly to even up the brown color.

It is sometimes found necessary, after finishing as noted above, to re-immerse the articles in the polysulphide dip for a second, which will produce a more even brown. After the brown finish has been produced, then cut down the high lights wherever required and color on a buff wheel, finally lacquering with a suitable gold lacquer.

The following solution may also be used in place of the one given above for producing the brown finish:

Water	1 gallon
Polysulphide	2 ounces
Barium sulphide	1 ounce

—C. H. P. Problem 2,722.

FLUXING

Q.—I am doing some hot tinning on steel stampings for the prevention of rust. I am getting very good results by using straight block tin, but this process is very expensive. After the work has been tinned it is given a heavy coat of enamel so it does not matter about the color of the finish, but it must be smooth.

I understand that there is a process whereby 90 per cent. lead and 10 per cent. tin are being used with success and that a very smooth deposit is produced. It seems that in this process the flux which is used for cleaning the work is poured on the top of the molten metal. Thus the work is emerged through the flux into the molten metal then taken out of the metal pot a finished product. I have tried many different mixtures in order to find a suitable flux that will stand up under about 635 degrees of heat, but have not been successful. My metal pot has a division that extends from the top of the molten metal to the top of the pot, so that it is an easy matter to emerge the work through the flux into the metal and under the partition in the metal pot out through the clean metal on the other side.

Can you give me an idea of what the process is?

A.—when alloys are high in lead the molten metal should be covered to a depth of three inches with 9 parts, by weight, of beef tallow and 1 part of palm oil. All tallow may also be used.

The flux should consist of muriate of zinc, and to every gallon of muriatic of zinc dissolve about 4 to 5 pounds of granular gray sal ammoniac. The muriate of zinc is prepared by dissolving sheet zinc in muriatic acid until the acid cannot absorb any more zinc. When cold strain and add the sal ammoniac.

After the articles have been coated in the lead alloy immerse them in a solution heated to 180 degrees Fahr. and consisting of 1 gallon of water and 4 ounces of carbonate of ammonia. Immersion in this solution will produce a smooth deposit.—C. H. P. Problem 2,723.

MIXING

Q.—We have a metal known as "Lumen" metal, consisting of 85 of zinc, 10 of copper and 5 of aluminum. We are experiencing a lot of trouble in getting solid castings with this mixture. Can you give us any information as to how to proceed to overcome porosity? What effect has phosphor-copper on this mixture?

A.—This is a die casting alloy and gives best results when cast in metal molds. Bearings can be made from it using metal molds and a high gate, but the use of the die casting machine is much more satisfactory. In making the alloy all of the copper and aluminum should be melted together in a crucible and then poured into small ingots. Remelt this intermediate alloy and pour it into the zinc which is best melted in an open flame furnace. Stir well and pour at a low heat. The use of phosphor copper in this alloy is not recommended. No other deoxidizer than aluminum is needed. The use of Grade A zinc, very low in lead, will give a stronger, better alloy than prime western zinc. If you melt this alloy quickly, pour it fast and at a low heat in well vented metal molds, no trouble should be had with porosity. Like all metals containing aluminum "Lumen" metal has a tendency to form an emulsion with any air present in the mold or carried in during the pouring operation. Hence, it should be run into the mold with as little agitation as possible.—J. L. J. Problem 2,724.

OXIDIZING

Q.—Will you favor me with the correct formula for an arsenic and caustic soda solution for oxidizing brass?

A.—The proportions for an arsenic solution prepared with caustic soda is as follows:

Water	1 gallon
Caustic soda	8 ounces
Powdered white arsenic	10 ounces

Use brass, carbon or steel anodes and 2 volts. In order to prepare the solution dissolve the caustic soda in about half the water at a temperature of about 100 degrees, then dissolve therein the arsenic and add the balance of the water. The solution is then ready for use.—C. H. P. Problem 2,725.

MOULDING

Q.—We expect to make some brass castings in steel moulds and would like to know what we should put in the mould that will protect it from becoming pitted and will also make smooth castings.

A.—We would advise that moulds made of cast iron will answer your purpose better than those of steel and the usual practice is to use a coating of an oil with a high flash point such as lard oil or a mixture of oil such as is used for the low pressure cylinders of stationary engines.—K. Problem 2,726.

PLATING

Q.—Can you give us some advice as to the size and thickness and also quantity of silver anodes to use in our plating solution. We will handle in our tank up to about 99 square inches of surface and as we figured it, we would need somewhere between 450 and 500 square inches of anode surface, this would make on both sides of the anode the same number of inches as on the goods being plated, or the cathode. We also believe that these anodes should be made small enough so that we can either take them out or change them to the cathode side in working in order to keep our solution properly balanced.

A.—The laws of electrolysis state that the anode surface should always be equal to the cathode surface and if slightly in excess the bath is enriched with metal to a greater extent. As both sides of the anodes are not reduced equally, it is advisable to make allowances for this deficiency in the anode surface. That is, the back of the anodes are not exposed to direct action of the cathode.

We would suggest that in your case that anodes 3 by 9 by 3/32 inches be used. Eight anodes of these dimensions would give (figuring both sides) 432 square inches of surface. However, as explained above, both sides of the anodes do not reduce uniformly, therefore we would suggest that 12 anodes be used.—C. H. P. Problem 2,727.

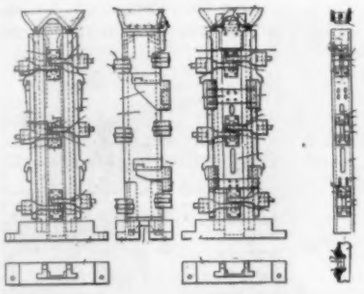
PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

The age of these patent notices is due to the delay in the issuing of patent reports.—Ed.

1,302,277. April 29, 1919. **Mold for Ingots.** Francis M. Bangs, Deep River, Conn.

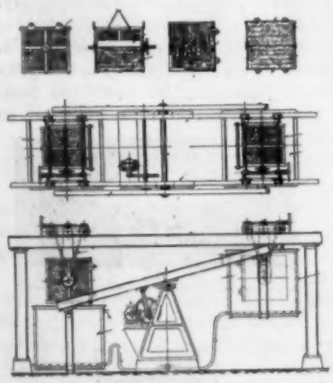
This invention relates to a mold for ingots and other forms of cast metal, and is an improvement on the structure shown in Letters Patent No. 1,276,609, issued August 20, 1918. The object of the present invention is the provision of a mold in which the parts are so constructed as to be easily and quickly assembled, and as easily and quickly separated, as well as one in which the several parts are made interchangeable, and the frame structure of the mold is so constructed as to make the same adjustable to provide for the use of mold-parts of varying sizes depending upon the dimensions of the ingot it is to cast.



The patent covers, as shown in cut, a mold comprising a front base block, a back base block, a front standard mounted in the front base block, a back standard mounted in the back base block, a mold back member removably supported on the upper ends of the said standards, a cross plate connected to the back standard, a support bracket pivotally connected to the said cross plate, a mold front member removably connected to the support bracket, which is adapted to swing to bring the mold front member into position relatively to the mold back member, and means for clamping the mold members together.

1,304,842. May 27, 1919. **Process of Extracting Metal Values.** Walter Zacharias of Neville Island, Pa.

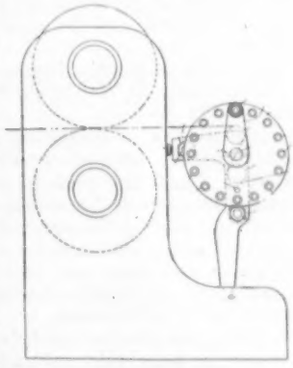
It is well known that certain metals, when subjected to the alternating action of oxygen or oxidizing agents and alkaline solutions, form salts which are either marketable in themselves or may be easily converted into marketable metal products. From a commercial standpoint tin stands in the foreground among these metals, and numerous methods and apparatus have been devised to attain the extraction of this metal from tin bearing material.



Among these, especially for recovering tin from tin scrap, are revolving drums, with hollow spindles and consisting of perforated plates which admit the solutions and also are intended for the admission of the oxygen of the atmosphere; further, perforated cases or baskets suitably suspended on beams or chains for dipping and removing the metal bearing charges into and from the solutions, are in use for this purpose, and also other devices too manifold to enumerate especially. There are, however, certain objections to be found in present methods, but these drawbacks are avoided, if instead of making the charge the movable element in the process, the solution is made movable. This is done by mounting, as shown in cut, the tanks filled with the solvents on some support moving about a fulcrum, or some similar arrangement, in counterbalanced relation, or otherwise arranging the solvents in counterbalanced relation, that practical experience and the practical requirements of the case might suggest.

1,305,069. May 27, 1919. **Bridling Apparatus for Rolling Mills.** Henry T. Cross, of Waterbury, Conn., assignor, by Mesne assignments, of one-half to Connecticut Brass & Manufacturing Corporation, of Waterbury, Conn.

The object of the present invention is to reduce the time and labor required for "threading" a rolling mill, to the minimum, and also to provide convenient and speedy means for varying the tension or drag as required for different weights of metal and different grades of stock.



With these ends in view, the invention consists in a bridling apparatus having a movable bridle, and means for bodily moving the same into threading and bridling positions.

The invention further consists in a bridling apparatus comprising a rotary bridle and adapted to be turned to deflect the sheet-metal strip to a greater or less extent according to the amount of tension required, and means for turning it and holding it in place.

The invention further consists in a bridling apparatus having certain details of construction and combinations of parts as shown in cut.

1,305,166. May 27, 1919. **Alloy.** Wm. J. Reardon, assignor to Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa.

This invention relates to alloys, and it has particular reference to alloys in which extreme lightness is combined with great tensile strength. The object of the invention is to produce alloys of the kind designated having improved properties that render them especially well suited to the manufacture of castings.

The inventor says:

"My alloys may be compounded in a wide variety of proportions. According to one formula which I have found highly successful, I prepare an alloy of aluminum and vanadium containing 20% of vanadium and 80% of aluminum. I then prepare an alloy of aluminum and magnesium containing 92 to 93% of aluminum and 7 to 8% of magnesium. Finally, I add one-fourth of one per cent. of the aluminum-vanadium alloy to 99.75% of the aluminum-magnesium alloy. The final alloy, therefore, contains only .05 of one per cent. of metallic vanadium. This alloy casts readily, and has a tensile strength of over 28,000 pounds.

1,305,300. June 3, 1919. **Aluminum Alloy.** Archibald O. Mason, Chicago, Ill.

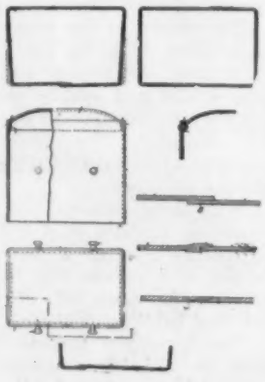
The main objects of this invention are to provide an improved aluminum alloy obtained by the addition of a comparatively small quantity of other metals which, without impairing the strength and lightness of the product, impart to it other qualities which make it superior to other aluminum alloys for general use in the formation of castings; and to provide an improved compound of aluminum, copper, and zinc which is peculiarly suitable for making castings and at the same time more ductile and more easily machined than the aluminum alloys which have been heretofore commonly used.

It is the purpose of the present invention to provide an aluminum alloy which possesses substantially all of the

valuable characteristics of the "standard" aluminum with regard to strength and lightness, but which overcomes the aforesaid objectionable characteristics. To that end, the present alloy involves reducing the amount of copper as compared with the "standard" alloy and adding a small quantity of zinc. The proportions which have been found to produce the most satisfactory results are substantially 91½% aluminum, 6½% copper, and 2% zinc.

1,305,605. June 3, 1919. **Annealing-Box.** Percy E. Hunter, Pittsburgh, Pa.

This invention consists of an improvement in annealing boxes adapted for the usual uses of such devices, and is particularly intended for use in annealing sheet metal used in the manufacture of tin plate.



In the use of such boxes, they are subject to the severe action of continuous heat at high temperatures, and especially to the cutting or deteriorating action of the flames of the annealing oven.

Generally stated, the improvement consists in providing the main body portion, i. e., the sides and ends, of a continuous uninterrupted integral wall of uniform thickness, and a top portion connected therewith, in such a manner as to present a series of outer surfaces to the action of the oven heat, in the absence of any objectionable variations or projections.

The box, as shown in cut, is composed of two main blanks, one for the main side and end portions, and one for the top portion.

1,307,299. June 17, 1919. **Apparatus for Casting High-Fusing Metals.** Clayton Laing, Chicago, Ill.

This invention relates to the casting of high fusing metals and in casting by gas pressure methods, the investing material being of necessity porous, it is necessary to hermetically seal the crucible end of the mold, from the edge of the ring or flask to the sprue hole, in order to concentrate the pressure on the molten metal within the mold. Any previous attempt at sealing the mold end was impractical for the following reasons: On casting, the sprue hole in the crucible was cast full of metal, which necessitates either destroying the crucible or reheating the metal to a molten state to remove the remaining button and sprue, thus cast into the crucible. Also, it is often desirable to attach two or more sprues to a large casting or to invest two or more small castings in one mold, which was impossible. Again, in heating up the mold to dry out the investment and dissipate the wax pattern, the steam generated had no outlet except from a minute sprue hole in the crucible and tended to blow out the crucible or the investment.

These difficulties applicant has overcome by a crucible of such design as shown in cut as to permit of the use of any desired number of sprues at an angle, the easy removal of residue gold, as well as furnishing an adequate vent for the escape of steam in the heating up process.

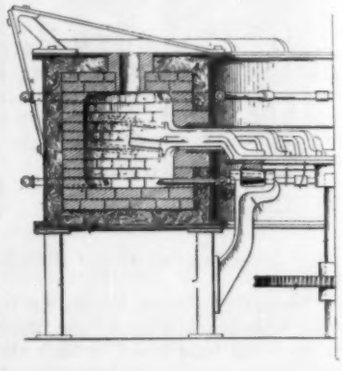
1,305,551. June 3, 1919. **Aluminum Alloy.** Henry C. Kirk, Roland Park, Md.

This invention relates to an alloy of low specific gravity and high tensile strength. It is produced by alloying Monel metal with aluminum in the proportions of 90% to 97% aluminum with 10% to 3% Monel, or, as a substitute for Monel a corresponding amount of nickel and copper, two parts nickel to one part copper may be used. As a rule Monel contains, probably as impurities, small quantities of manganese and iron. In testing the hereindescribed alloy, it is found that the presence of these so-called impurities gives a slightly improved result, particularly as to tensile strength.

An alloy consisting of 94% aluminum and 6% Monel, when tested in the form of sand castings, is found to have a tensile strength of from 19,000 to 22,680 pounds, with an elongation in two inches of from 3½ to 3%, its specific gravity being approximately 2.69. Cast in iron molds the tensile strength of the same alloy is from 25,140 to 25,310 pounds with an elongation in two inches of from 6½ to 5%, specific gravity being 2.70 to 2.72. Both alloys roll, draw or spin to the best advantage and make very sharp castings.

1,305,991. June 10, 1919. **Annealing Furnace.** Joseph J. Beeman, of Detroit, Michigan, assignor to Standard Fuel Engineering Company, of Detroit, Michigan, a corporation of Michigan.

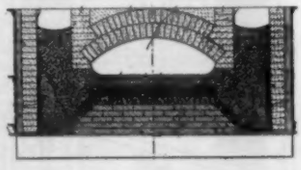
This invention relates to annealing furnaces, and its object is to provide an improved structure, as shown in cut, in which the articles to be annealed are carried through the heating conduit or chamber in such manner that the surface thereof is uniformly subjected to the heat of the furnace. A further object is to provide a means for suspending the articles to be annealed and to continuously move the same through the furnace for the required period of time. A further feature of the invention is involved in the means employed in carrying the articles to be treated through the furnace and in the particular construction of the heat chamber or conduit.



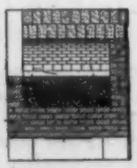
The patent covers an annealing furnace or the like comprising a conduit annular in form and having spaced ends providing an inlet and outlet therefor, means for heating the conduit, the inner wall of the conduit having a circumferential slot formed therein, and a series of article carriers extending through the slot into the conduit adapted to be rotated about a vertical axis and passing the articles to be heat-treated through the furnace from the inlet to the outlet, the said spaced ends exposing a number of article holders to view to allow for the ready removal and positioning of the articles on the said carriers.

1,306,250. June 10, 1919. **Electric Furnace.** Ora A. Colby, of Larimer, Pennsylvania, assignor to Westinghouse Electric and Manufacturing Company, a corporation of Pennsylvania.

This invention relates to electric furnaces and particularly to an electric-resistance furnace that may be operated continuously for comparatively long periods and be adapted to produce high temperatures for heating metals and also for other heating applications.



The object of the invention is to provide an electric furnace that shall have a low rate of deterioration under service conditions at high temperature of 1000° C., or above, since, to be commercially successful, such furnaces should require only infrequent and inexpensive repairs and renewals.



The supporting structure of the furnace, shown in the cut, comprises an exterior metal casing or frame which incloses fire-brick walls and a floor of suitable highly refractory material.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

CONTINUOUS CLEANING MACHINE

The machine shown in Fig. 1 is a continuous process machine for removing light grease from screw machine work and is not in any sense a tumbling barrel, but is adapted to handling all kinds of small screw machine and similar work, including threaded work. The drum revolves at 7 revolutions per minute and the work lies at all times on the bottom of the drum, being impelled from the charging to the discharging end by the rotation of the drum and worm. By means of a cup construction, the work is carried from the washing drum into the draining screen without being dropped. This is most important in preventing the marring of delicate work.

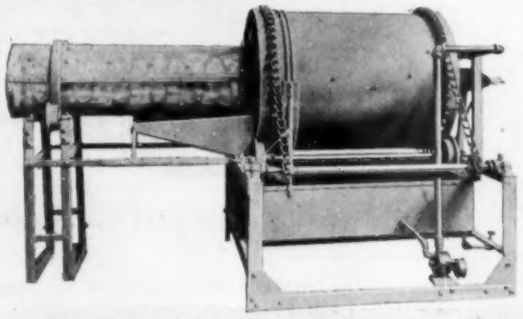


FIG. 1—CONTINUOUS PROCESS MACHINE FOR REMOVING LIGHT GREASE.

OPERATION

The articles to be cleaned are put in at the charging end of the drum and are gradually impelled to the discharging end as the drum revolves. At the end of the worm a cup picks up the parts and turns them out into the attached draining screen. The cleaning compound is pumped from the heating tank beneath the machine into the charging opening of the drum and drains back into the heating tank through the holes in the periphery of the drum near the discharge end. The auxiliary pan catches any chips which may adhere to the work and prevents these from reaching the bottom of the heating tank. The drum is automatically kept full of hot washing compound up to a point just below the level of the charging opening so that the work is constantly submerged in hot washing compound and comes out of the drum clean and hot enough to dry itself.

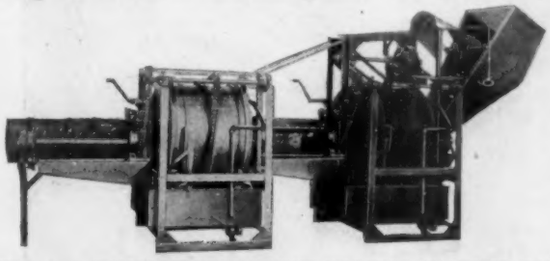


FIG. 2—A DOUBLE DRUM BATCH PROCESS MACHINE FOR HEAVY GREASE.

Fig. 2 shows a double drum batch process machine with a draining screen and power loader and which is used for removing heavy grease from metal stampings and similar work. In this machine the drum is supported and revolves on four roller-bearing trunnions flexibly hung, and is equipped on the inside with four blades extending from the charging end halfway around the circumference to the discharge side where there are two cups. The discharge chute of the machine is so arranged that it can be either inclined to discharge the work from the machinery or to carry the work back to the charging end of the drum. The washing compound circulates from the tank beneath the machine into the drum and returns to the heating tank through the holes in the periphery of the drum near the discharge end.

OPERATION

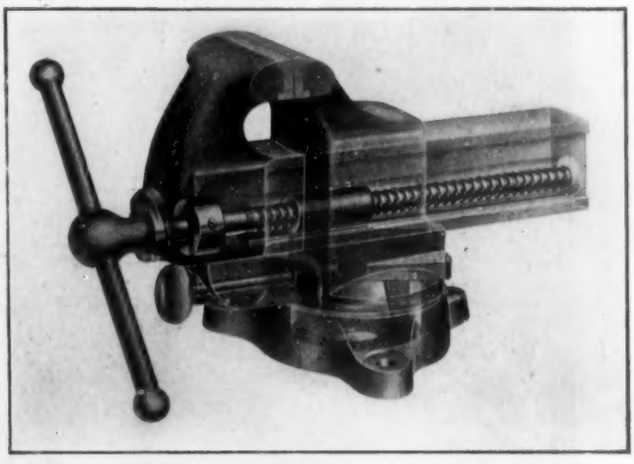
The work, after being placed into the charging side of the machine, is impelled to the discharge side where it is turned on to the chute and falls back to the charging end once more. In this way the work can be continuously carried through the washing compound until it is cleaned. By turning a lever the discharge chute is so set that it discharges into the draining screen all the work as it is carried to the discharge end of the drum. After the work is thoroughly cleaned the drum is emptied into the draining screen and the work passes on through same to the rinsing drum, through which it passes and comes out into the drying screen. The work is dried and drained in this revolving screen, from which it falls into tote pans or barrels.

The above machines are manufactured by the Ideal Concrete Machinery Company, Colerain avenue, Cincinnati, Ohio.

THE WEDG-LOK VISE

The Jahant Foundry and Heating Company of Akron, Ohio, have recently placed an entirely new type of vise on the market known as the Wedg-Lok Vise. It promises to effect a radical evolution in vises and its performance thus far seems to justify the manufacturers in calling it "The Perfect Vise," while a study of its salient features would seem to substantiate their claims. The accompanying phantom view will help to give a comprehensive idea of the appearance and operation of The Wedg-Lok Vise.

In looks it does not differ greatly from ordinary vises. It is very compact and sturdily built, being ample to stand the strain of all ordinary demands. The vise, proper, sets into a turntable base which permits the upper part of the vise to be turned around in a complete circle. This makes it possible for a workman to easily adjust his work to any desired angle.



THE WEDG-LOK VISE.

The important point with this vise is its locking feature which is accomplished automatically when tightening the jaws. A slight turn of the main screw loosens the wedge-lock sufficient to permit the vise to be turned without removing work from the jaws.

If it is desired to lock the vise in any one position for permanent work, a turn of the thumb screw quickly accomplishes this result. When the job needs to be turned, turn the vise, not the job. This feature practically makes of The Wedg-Lok Vise, a dozen vises in one.

A vise which possesses all these virtues is sure to become exceedingly popular with workmen as well as with shop owners because of its unusual time-saving possibilities. The manufacturers will gladly mail illustrated and descriptive literature on request.

KENWORTHY NON-OXIDIZING ANNEALING FURNACE

As is well known in the manufacture of brass and copper, one of the most important steps in the mechanical operations is that of annealing. If either of these metals in their progress through reducing operations are not thoroughly softened or annealed, serious ruptures and fractures result. While the annealing operations as usually carried on are not particularly obnoxious, the attendant cleaning or pickling operation is. Any method, therefore, that will eliminate the troublesome and disagreeable pickling process is to be regarded as a distinct step in the advancement of the art of metal manufacture.

To this end the Kenworthy non-oxidizing annealing furnace, shown in the accompanying cuts, is to be regarded as a great step ahead. The furnace shown is known as the vertical type and consists of a cylindrical retort, open only on the bottom and is set over and extends downwardly into a tank of water for a sufficient distance to form a seal. The furnace is heated either by gas or oil and the annealing heat is generated in an annular combustion chamber surrounding the retort. The outer wall of this combustion chamber consists of a cylindrical steel shell lined with Nonpareil insulating brick and fire brick. This shell or casing never, during the course of operation of the furnace, becomes too hot for the naked hand to rest upon.

The furnace, as may be seen from the illustration, Fig. 1, is extremely simple in operation. An elevator, having two or more platforms, operated by a water plunger, is located in the sealing tank and so arranged with guides and automatic lock that when one of the platforms, holding an annealing charge, is in the retort, another is outside being cooled and unloaded.

Fig. 2 shows a charge of copper wire which has just been

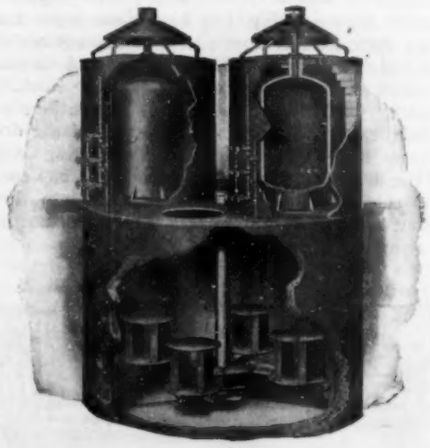


FIG. 1.—SECTIONAL VIEW OF KENWORTHY NON-OXIDIZING FURNACE

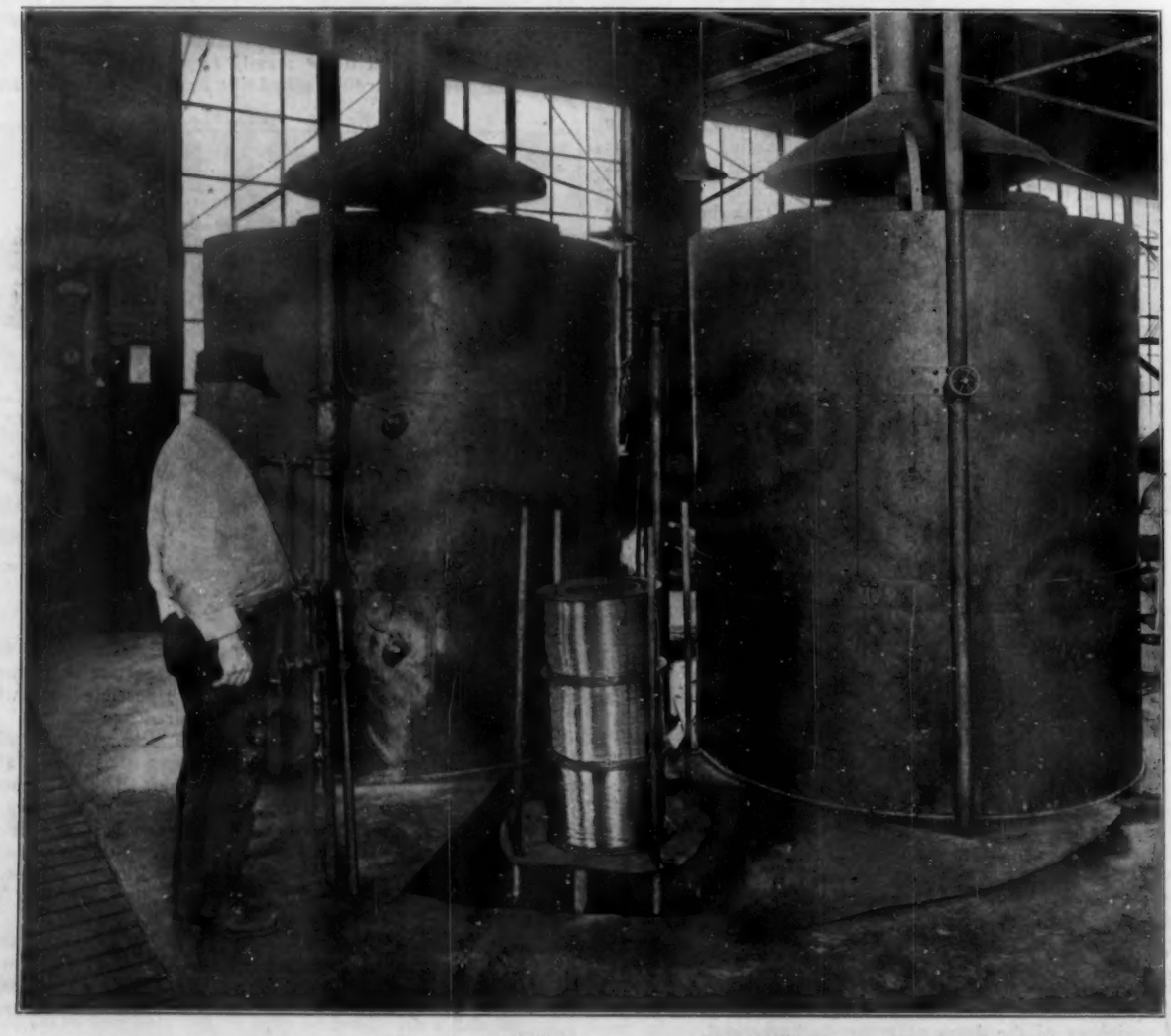


FIG. 2.—THE KENWORTHY NON-OXIDIZING ANNEALING FURNACE. THE COPPER WIRE IS AS BRIGHT AFTER ONE HOUR IN THE FURNACE AS BEFORE IT WENT IN BUT IT IS NOW SOFT INSTEAD OF HARD.

annealed in a Kenworthy non-oxidizing annealing furnace installed at the plant of the Habirshaw Electric Cable Company, Yonkers, N. Y., and it will be noted that the wire is just as bright after having been in the furnace for one hour at a temperature of 1,000 degrees as it was when it went in.

The fuel consumption, owing to the sealed heating chamber, is very low, being considerably less than that of the open-type furnaces, and in general practice, the heating chamber, when the furnace is run on a ten-hour-day basis, will have from 600 to 800 degrees Fahr. in the morning before starting up for the day.

An interesting feature of this furnace is the absolute temperature control that it is capable of. As is shown in Fig. 2, pyrometers are installed at the top and bottom of the retort chamber, the conducting wires being carried over to a registering dial which may be located on the wall. By this means the temperature at any period of the operation is instantly noted and any deflection may be corrected by the operator.

These furnaces are built in either vertical or horizontal types and in a large number of sizes. The smaller furnaces are designed for setting on a bench or floor, while the larger ones are set with their loading surface at the floor level, the tanks being depressed into the floor. The furnace shown in the cuts is the vertical type and has a capacity of 5,000 pounds of metal per hour.

Further information regarding these furnaces may be obtained by corresponding with Charles F. Kenworthy, Waterbury, Conn.

JAPANNING AND ENAMELING COT AND BED FRAMES

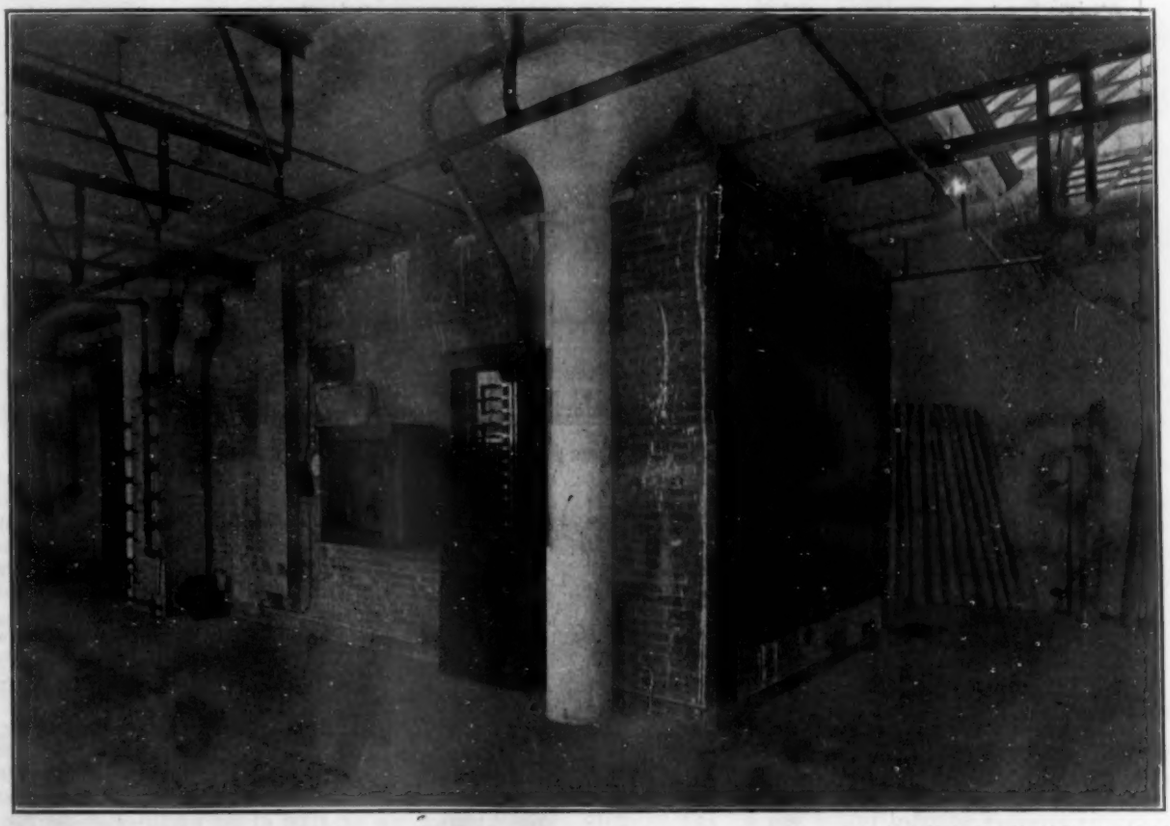
There are so many manufacturing processes which require ovens or furnaces heated to different degrees of temperature for one or more operations that the field for electrically generated heat is becoming larger every day.

"Ovens heated by steam, oil or gas have been in use for some time and have been fairly successful," says A. M. Clark, Industrial Heating Department, General Electric Company, "but no one will contradict the statement that electrically generated heat in most cases produces better and more uniform results. Wherever applicable, it is usually cheaper in the long run, due to the avoidance of losses which are present in gas, steam or oil heated ovens.

"Skilled workmen are being concentrated more and more on our most vital industries, but other industries must continue to manufacture with the best help obtainable. Unskilled labor can be employed where electrically heated ovens are used without lowering the standard quality of the product. This is, in a great measure, made possible by the fact that the temperatures in an electrically heated oven may be automatically controlled within very close limits.

"The New York Couch Bed Company, of Long Island City, N. Y., manufacture all kinds of couches, beds and hammocks, both collapsible and otherwise.

A japan baking and enameling oven equipped with General Electric heaters and automatic temperature control bakes the finish on the metal frames, brace rods, and legs of beds, couches, etc. This oven is 21 feet long and 8 feet wide, 9 feet high, and is insulated throughout with a double course of heat insulating material, protected by a facing of common building brick. The inside walls and ceiling are lined with sheet metal. The cut shows the outside of this oven with the automatic control and part of the ventilating system. The heaters installed total 45 KW. and are distributed under the floor throughout the length of the oven, being connected in series parallel. Two controlling Tycos thermostats, one for each end of the oven, through relay coils to the contactors, control the temperature, thereby affording a very even distribution of heat in all parts of the oven. At the left are shown the motor, blower and part of the ventilating system for carrying off the vapors which are given off by the japan during baking. Two-thirds of the ventilation is from the bottom of the oven and the other third being from the top. Ventilation is provided for in this way, because most of the vapors from japan and enamel are heavier than air and sink to the bottom of the oven.

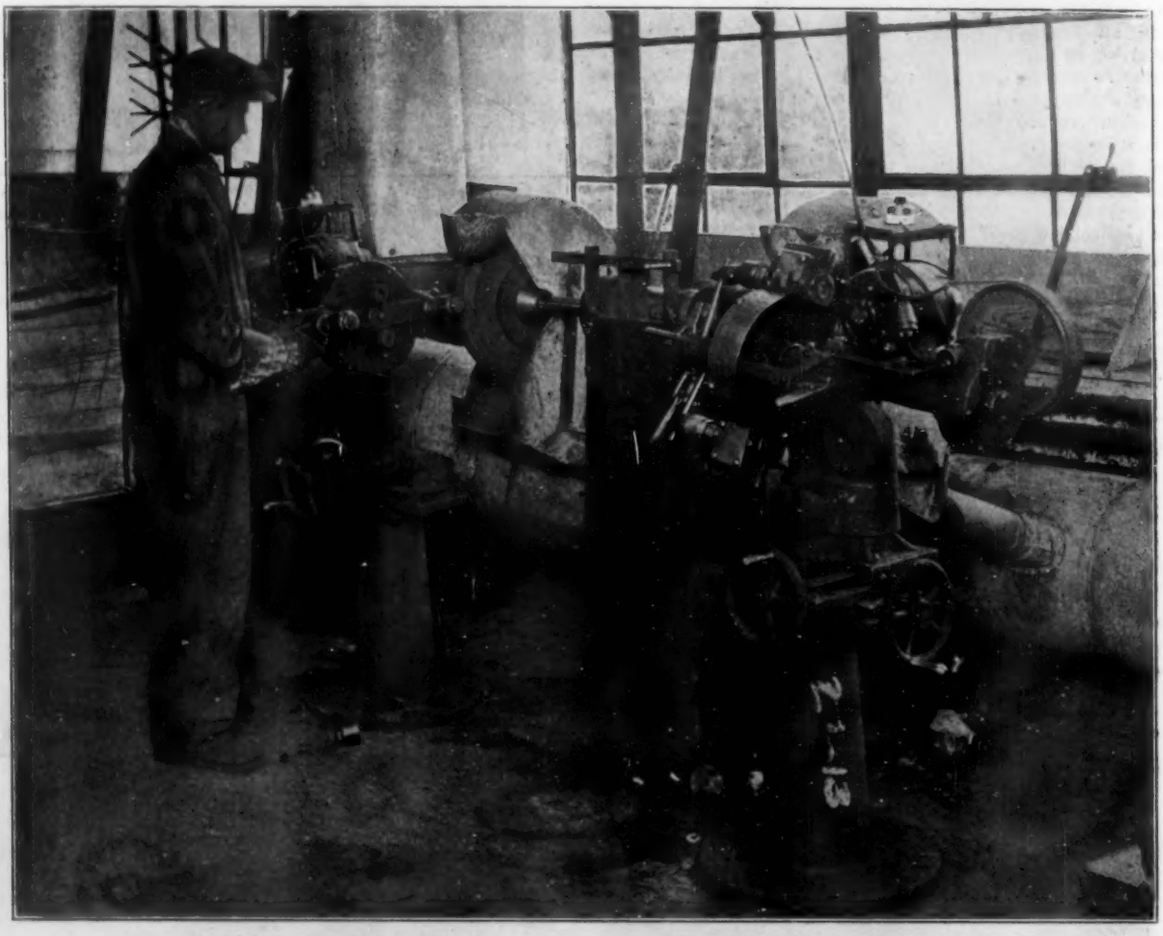


AN ELECTRIC JAPANNING FURNACE FOR COT FRAMES BUILT BY GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

The parts to be treated are baked for 3 hours at a temperature of 170 deg. F. The work is either run in by means of an overhead conveyor system or put on racks on trucks which are placed in the oven.

BUFFING AND POLISHING LATHE

The polishing and buffing lathe shown in the accompanying illustration is designed especially for the polishing and buffing of all kinds of plumbers' supplies, or, in fact, any articles of metal that are cylindrical in form. Some of these articles which might be mentioned are hub caps for automobiles, clock cases, floor flanges, parts of electrical and gas lighting fixtures and thousands of other small round parts.



ACME BUFFING AND POLISHING LATHES FOR FINISHING SMALL METAL OBJECTS.

An important feature of this machine is the double spindle which is so arranged that while one spindle revolves the work against the polishing wheel the other one is turned outwardly, making it convenient for the operator to remove the finished part and put another one ready for polishing.

The machine, as shown in the cut, can be bolted to the floor in front of the polishing lathe, and there are longitudinal and cross slides for adjusting both ways so that the work can be properly adjusted to the wheel. The top part revolves in a horizontal direction and is also so jointed that lowered down it revolves in a perpendicular direction by which means universal motion is obtained which also allows the machine to be properly adjusted to the polishing wheel.

These lathes are also built with single spindles adapted for larger work.

The polishing and buffing lathes are manufactured by the Acme Manufacturing Company, 350 Howard street, Detroit, Mich., who also manufacture a line of belt polishing machines for use on reflectors of all kinds. Further information may be obtained by corresponding with the above company.

THE METZ AGITATOR MACHINE

The Metz Agitator Machine has just been put upon the market and can be used for both electro-plating and electro-cleaning. The manufacturers, The Metz Structural Steel Company of Bridgeport, Montgomery County, Pa., state that three times as much work can be done in a given time in the Metz machine, that iron or steel can be cleaned without fear of peeling, and that the old way of cleaning means time and labor while with this machine the only consideration is the first cost.

The Metz nickel plating machine can be built to fit any size wood or steel tank. The work to be plated is placed on the negative plating rod with racks or wire, the agitator is started in motion thus raising and lowering the negative rod at the rate of 15 R. P. M. The agitation, it is stated, drives all the hydrogen and oxygen gases from the work while plating, which keeps the work from pitting. The agitation also allows greater current density and by keeping the work in motion while in the solution from one-third to one-half the time is consumed than by still plating. While die casting in the art of nickel plating has been very unsatisfactory in still plating, the agitation of the work will enable the plater to use more current without burning the work and give better results in less time than still plating and will require less buffing. This machine was exhibited for the first time at the convention of the American Electro-Platers Society at Philadelphia, Pa., July 1, 2 and 3.

The Metz Structural Steel Company also manufacture welded and riveted steel tanks for potash, lye, soap solution and hot water. They also make lacquer ovens and drying rooms of steel with steam coils.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN SOCIETY FOR TESTING MATERIALS

This society held its annual meeting June 24-27 at Hotel Traymore, Atlantic City, N. J. The program, as announced in THE METAL INDUSTRY for May, included a session on metals, Thursday, June 26. At this session the report of committee E-4 on magnification scales for micrographs, W. H. Bassett, technical superintendent American Brass Co., Waterbury, Conn., chairman, offered a number of amendments to its last report. It recommends this, for example, for general use in society reports and for showing grain size, 100 magnifications for steel and various metals, and 50 and 100 in the cast copper and 75 in the case of wrought copper.

NEW STANDARDS PROPOSED.

The recommendations by committee B-2 on non-ferrous metals and alloys include those for cartridge brass, cartridge brass disks, naval brass rods for structural purposes, methods for chemical analysis of manganese bronze, and methods for chemical analysis of gun metal.

Proposed new tentative standards have been recommended by committee B-1 on copper wire, for tinned soft or annealed copper wire for rubber insulation; by committee B-2 on non-ferrous metals and alloys, for brass ingot metal for sand castings, for bronze bearing metal in ingot form, for lead, for solder metal, method for battery assay of copper and method for chemical anaylsis of pig lead. Committee B-2 recommends the continuance as tentative standards those for aluminum ingots, for aluminum sheet, and for light aluminum casting alloys.

MEMORIAL SESSION.

A memorial session was held Tuesday evening, June 24, in honor of Dr. Edgar Marburg, who was secretary-treasurer from 1902 until his death on June 27, 1918, at the time of the last annnual meeting.

Addresses were made on the life and life work of Professor Marburg by John M. Goodell, formerly editor ENGINEERING RECORD, who devoted himself to Dr. Marburg "As an Engineer"; by Robert W. Lesley, Philadelphia, on "Early Activities in the Society"; Prof. Arthur N. Talbot, University of Illinois, on "Recent Activities in the Society," and Capt. Robert W. Hunt, Chicago, the title of whose address was "A Personal Tribute."

OFFICERS ELECTED.

The following officers were elected for the ensuing fiscal year:

For president, J. A. Capp, chief testing laboratory, General Electric Co., Schenectady.

For vice-president, C. D. Young, superintendent motive power, Philadelphia, Baltimore & Washington Railroad, Wilmington, Del.

For members of executive committee, Ernest Ashton, H. F. Moore, C. F. W. Rys and Admiral D. W. Taylor.

FINANCIAL.

The surplus of the society was increased in 1918 from $11,955.53 to $14,284.04. The disbursements for publications were $21,714.48, for salaries $9,870, and for expenses of delegate to International Aircraft Conference in London $1,865.03. An investment was made in $5,000 of Liberty bonds. The total disbursements were $42,521.75.

AMERICAN ELECTRO-PLATERS' SOCIETY

New York Branch—Meets second and fourth Fridays of each month at 32 Union Square, New York. Secretary, John Burke, 110 Glen street, Brooklyn, N. Y.

The newly elected officers for the ensuing year were installed at the first June meeting held on June 6 by Joseph Dinan of the Philadelphia Branch, assisted by Mr. Dabolt of the New York Branch. The new officers are: J. E. Sterling, president; W. Fisher, vice-president; John Burke, secretary and treasurer; S. Schubert, recording secretary; L. Pflomn, librarian; R. Masicot, sergeant at arms; T. Noonan, assistant sergeant at arms, and T. Haddow, W. Voss, M. Stewart, J. Straub and H. Flanagan, trustees.

The report of the secretary, William Fisher, proved that the branch was financially sound. The following subjects were discussed: Solubility of silver cyanide (Ag. C. N.) in sodium cyanide (Na CN), cleaning and coloring of metals, nickeling die castings and plating room floorings.

The second June meeting was held on June 27 and Mr. Manning, formerly secretary of the Syracuse Branch, was a visitor. Mr. Manning spoke on the importance of alloying anodes to get the desired shades in gold plating. The other subjects under discussion were: Black nickeling by the barrel process, plating rheostats and nickel-silver deposits.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES

The week of September 22, when the greatest Exposition of the Chemical Industries in the world holds forth in the Coliseum and First Regiment Armory, will be a week of convocation of societies in Chicago, Ill., with the Exposition.

The American Institute of Mining Engineers will occupy the stage for the first part of the week, American Ceramic Society meets on Wednesday, September 24, the American Electrochemical Society on Thursday, Friday and Saturday, the 25th, 26th and 27th, the Technical Association of Pulp & Paper Industry on the 24th, 25th, 26th and 27th.

There will also be among the interesting features of the Exposition program a symposium upon Safety in the Plant and Mine with speakers of authority in this work under the chairmanship of M. L. Leopold, Safety Engineer of the United States Bureau of Mines, and in the evening after this meeting—which will occupy an entire afternoon—there will be shown a series of motion pictures of safety work in plant, field and mine,—pictures now being made in industrial plants all over the country under the supervision of Government agents.

The motion picture program will consist almost entirely of films now being made and the completion of which will be hastened to be ready for the initial showing at the Exposition.

Even in motion pictures as in all important improvements in plant, machinery and products, the Exposition is outstanding as the place of introduction to the public of the newest and most recent developments. Each improvement of the projectoscope in motion picture projection has been reserved for first public demonstration at the Exposition and again this year will have the latest developments in this field of endeavor.

There have been many developments in the way of new exhibits that are engaged for the Exposition: of these, it is not circumspect to mention all, but mention may be made of the group of electric furnace exhibits that will be there and in operation.

AMERICAN FOUNDRYMEN'S SOCIETY

Secretary C. E. Hoyt reports in reference to the convention and exhibit to be held in Philadelphia, Pa., the week of September 29, that although they have not yet sent out floor plans of Exhibition Hall they have received applications for space totaling more than has ever been used in previous exhibits, with the exception of the first Chicago convention in 1913. There is no question, according to Mr. Hoyt, but that the Philadelphia exhibit, in number and interest, is going to exceed all previous ones. The papers are going to be unusually interesting, both for the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers and the American Foundrymen's Association.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

George Thompson, for the past six years foreman plater with the Robert Mitchell Company, Montreal, Canada, is now connected with the Tallman Brass Company, Ltd., of the same city.

Frank L. Giffing has resigned his position as foreman plater with the National Scale Company, Chicopee Falls, Mass., to accept a similar one with the M. S. Wright Company, Worcester, Mass.

Alex Lentz, for the past five years secretary and manager of sales of Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Canada, has resigned that position and will be associated with the Kent Ockley, Ltd., Toronto, as vice-president, secretary and treasurer.

William Voss, who was recently elected one of the trustees of the New York Branch of the American Electro-Platers' Society, is well known to the readers of The Metal Industry for his articles on metal finishing subjects. Mr. Voss is connected with the sales force of the Hanson & Van Winkle Company, Newark, N. J., with headquarters at 81 Walker street, New York City, and represents the company in the Metropolitan District. Mr. Voss is one of the charter members of Electro-Platers' Society, and is also chairman of the laboratory committee of the New York Branch. His wide experience and technical training in the chemical and electrical fields have always been at the service of the foreman electro-plater and manufacturers for the purpose of helping them out when in difficulty.

DEATH

EMANUEL BLASSETT

EMANUEL BLASSETT.

As reported in the June issue of THE METAL INDUSTRY, **Emanuel Blassett,** owner of the E. Blassett & Company, of Burlington, Vt., died on April 27, 1919, after an illness of fifteen days. Mr. Blassett was in his fortieth year and spent his early life in and around Bridgeport, Conn., where he was educated in the local schools. At the age of sixteen he became interested in the plating of metals and served an apprenticeship with the Liberty Cycle Company, of Bridgeport. He spent practically all of his spare time reading and studying books on plating and took a course on that subject with the International Correspondence School and course in chemistry with the Y. M. C. A.

Among the companies in Bridgeport with which Mr. Blassett was connected were the Weld Manufacturing Company, International Silver Company, Warner Brothers Company and the Union Typewriter Company. In 1907 he took charge of the plating department of Peck, Stowe & Wilcox Company in Southington, Conn., where he remained for two years. In 1909 he became connected with the A. B. Hendryx Company, of New Haven, Conn., and in 1912 he entered the employment of the Burlington Mirror and Plating Company, of Burlington, Vt., which he purchased in 1914 and which he continued to operate under his own name until his death.

Mr. Blassett was a member of the American Electro-Platers' Society for the past nine years and wrote many articles on plating subjects for THE METAL INDUSTRY. Some of Mr. Blassett's articles were as follows: SILVERING OF MIRRORS, December, 1913; RUST-PROOFING OF IRON AND STEEL ARTICLES, January, 1914, and METAL COLORING BY THE CORROSION PROCESS, January, 1915. He is survived by his father and four sisters, all of whom reside in Bridgeport.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

JULY 7, 1919.

Recognition of a newly-formed union among Waterbury's workmen is now the only stumbling block before a complete reconciliation between the 7,000 strikers who have stayed out of work for nearly two weeks and the local manufacturers. There is a possibility that the strikers will return to work without this recognition in view of the substantial increases in wages which they have been granted.

A large number of the manufacturers have announced an increase of 25 percent to all workers earning over 40 cents an hour with an increase of 10 cents an hour for laborers working by the hour with a proportionate increase for piece workers. An eight hour day with time and one-half for over time will be in order for both classes of workers.

The 25 percent increase is said to be the greatest jump in wages in the history of this part of the country. Manufacturers who won contracts by bids figured on the old wage scale are said to stand good to lose money for the next six months. An eight hour day will be the basis of the working day so far as wages are concerned, but the actual working day for skilled workers will probably be nine hours with nine or ten hours for ordinary help. This will be necessary to fill the orders.

Most of the skilled mechanics of the city receive 60 cents an hour at present, and when the 25 percent increase goes into effect, they will be among the best paid workers in the east.

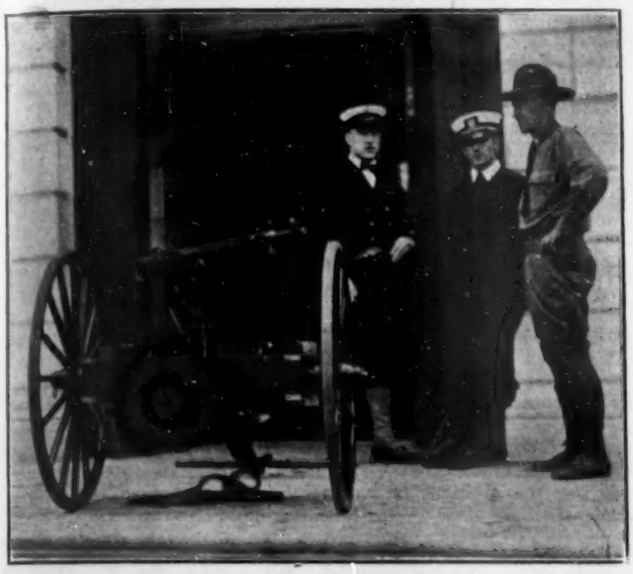
This concession will not only go far toward bringing the strikers back to work, most of whom are of the unskilled laboring class, but has probably prevented a widespread strike among the machinists who had plans laid for a walk-out in the immediate future.

The strikers are asking for a 20 cent an hour raise for all employes, besides recognition of the union, but it is thought that they will concede to the manufacturers' offer.

Representatives of the American Federation of Labor are in the city laying foundations for the organization of a union branch here. The deadlock seems to be in the fear among the strikers that those most prominent in the strike will lose their jobs when they return to work.

The manufacturers of the city refuse to recognize American Federation of Labor as well as the local union.

The city is still patrolled by the City Guardsmen and police with the state guard ready to be called out at a moment's notice to prevent a repetition of the riot which occurred near the Benedict and Burnham branch of the American Brass Company on June 16. The riot started when some workers left their work in the American Brass about six o'clock. They were insulted by three or four women standing on the curb, who called them scabs and traitors. A battle ensued which soon involved a large number of strikers. The riot call was given and answered by the police. In quelling the disturbance, several policemen were injured, one severely, though it is thought that he will recover. Arrests and sentences of the rioters have occupied the city court for the past week.



MACHINE GUN AT CITY HALL AT WATERBURY, CONN., DURING THE STRIKE AMONG BRASS WORKERS WHICH OCCURRED IN JUNE, 1919.

Following the riot, the police allowed no public mass meetings among the strikers until the latter part of last week, when one was held carefully guarded by armed police.

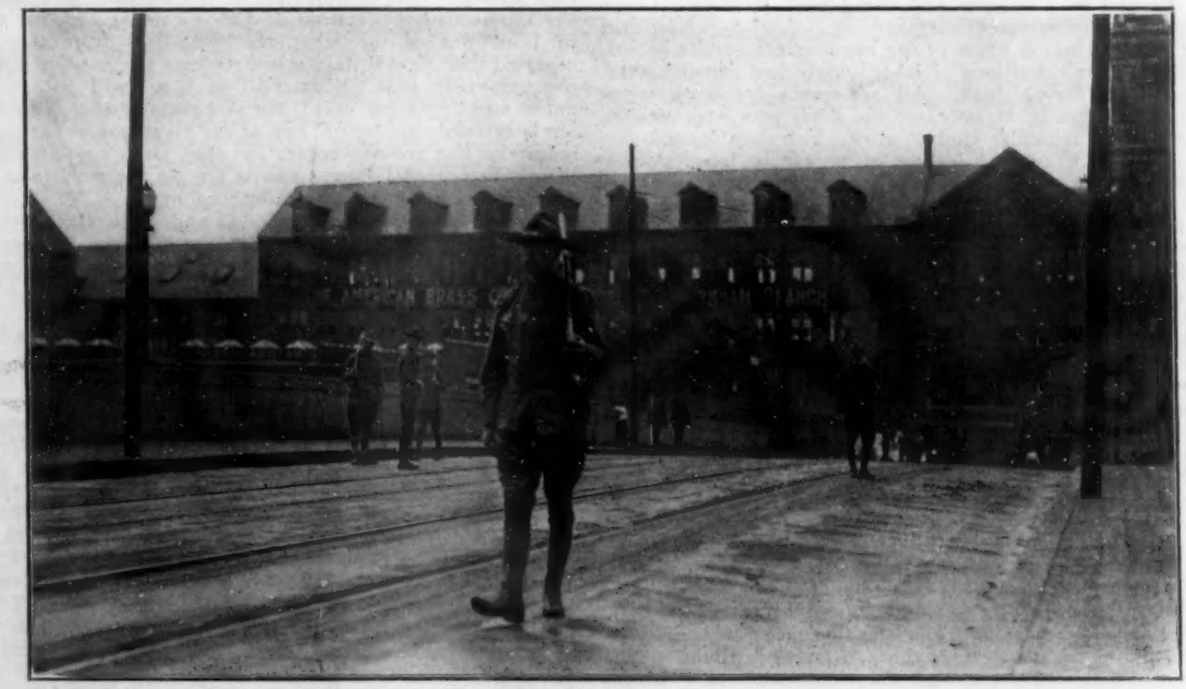
About 7,000 workmen and women struck altogether from twelve factories. The factories affected are: all branches of the American Brass Company, Randolph and Clowes Company, the Chase Metal Works, and the Chase Rolling Mills, the Scoville Manufacturing Company, the Waterbury Manufacturing Company, Plume and Atwood, Worcester Metal Goods Company and the American Pin Company.

The Waterbury strike seems to be one of a chain through the Naugatuck Valley, indicative of a strange unrest among the workers. The first workers to strike were 200 employes of the American Brass on Tuesday the 17th. At first none of them seemed to know exactly what they were striking for, the keynote of their complaint being that they must strike to support their fellow workers in the Ansonia mills of the American Brass who had been out for some time. After their demands were drawn up, they closely resembled those of the Ansonia workers, some being identical in wording.

The next day the number out rose to 3,000 from four factories. Then the number doubled on Thursday and increased later to 7,000.

Twenty-eight demands were at first drawn up, including many impossible and ridiculous requests which were later discarded by the wiser minds among the strikers. These included demands that all employes not taking part in the strike should be discharged, that all service men should be given jobs, that no striker should lose his job, and minor requests about the sanitary conditions and more equipment for the workers. Finally these narrowed down to the two that the union should be recognized and that all workers should be given a 25 cent an hour increase.

One interesting element of the strike is the part that the women have played. Women rioters caused most of the trouble. Three of them were arrested with the rioters. One was a delegate of the strikers from one of the factories.



STATE GUARDS PATROLLING THE PROPERTY OF THE AMERICAN BRASS COMPANY DURING THE RECENT STRIKE AT WATERBURY, CONN.

One result of the apparent success of the strike is already apparent. This is in a concerted effort among the landlords to raise rents and an immediate jump in the cost of meat and other necessaries of life.

All saloons were closed for nearly a week after the riot.

The city is now working to put in an extensive recreation program which shall give every facility to workers and their families for the best wholesome fun. New ball diamonds, tennis courts and playgrounds are being built with the possibility of a dance pavilion in the central part of the city. John H. Goss, secretary of the Scovill Manufacturing Company, is prominent in the movement. D. H. P.

TORRINGTON, CONN.

JULY 7, 1919.

Although operations in the metal industry plants in nearly all the larger towns and cities in this part of the state were hampered more or less by labor troubles during the past month, Torrington plants were singularly fortunate. There were no strikes and, in fact, no serious labor controversies of any kind here during the month. In several instances the manufacturers granted voluntary increases to their employes to help them meet the tremendous increase in the cost of living, and this generous attitude forestalled any demands which the workers might otherwise have prepared. The few groups of workers who expressed dissatisfaction received careful consideration and their requests, if found to be reasonable, were granted.

The employes of the Coe Brass Branch of the American Brass Company were given to understand that any concessions granted to employes at the other branches of the company would also be granted here. In Ansonia and Waterbury, many of the American Brass workers were on strike during the latter half of the month. On June 24, notices were posted at the Coe Brass Branch announcing an increase of ten cents per hour in the pay of all employes working on an hourly basis and a proportionate increase for piece workers. The new scale was effective from June 22. Notification was given at the same time that time and a half would be paid for all time over eight hours per day, but this rate had already been in effect at the plant.

Many of the workers at the Excelsior Needle plant of the Torrington Company and the Union Hardware Company plant also received increases.

At the Torrington office of the employment service it was stated that the conditions of labor supply and demand were about equal during June. All applicants for work were placed, although in many cases the applicants were unable to secure the particular kind of work which they desired.

There was a general feeling of unrest in labor circles throughout the Naugatuck Valley, and it was feared for a time that agitators might come here and seek to stir up trouble. If any agitators came, however, they worked in secret and accomplished nothing. Shortly after the outbreak of the strike in Waterbury, a nocturnal visitor distributed throughout Torrington, hundreds of copies of the proclamation issued by the Waterbury strike committee urging all workers to join in a general strike. "We are all the same members of the working class," the proclamation said, "and we must all join together and struggle for our interests. Only then we will win our full demands in very short time." The appeal went unheeded here.

Construction work has just been started on a big addition to the Standard plant of the Torrington Company. The addition will be two stories to the four story building which was erected only a short time ago at the end of Laurel avenue. It will be of brick with slag roof. The dimensions will be 300x50 feet, and the increased floor space, 30,000 square feet. When completed, this building will be the highest factory building in Torrington and one of the highest in this part of the state. The steady expansion in all departments of the plant made the construction of this addition imperative. The contract for the work was awarded to the Torrington Building Company.

The Torrington Company has purchased from the Torrington Ice Company, the tract of land north of the Progressive Manufacturing plant, between Norwood street and the tracks of the New Haven road. With the acquirement of this tract, the Torrington Company owns all the land between Norwood street and the railroad tracks, from Forest street to North Elm street.

The Torrington Club has leased to the Torrington Manufacturers' Association the manufacturers' room in the clubhouse for a period of fifteen years. The rental paid was $10,000. This was used by the club to pay off the mortgage on its property. Heretofore the manufacturers have been renting the room by the year, paying $1,000 per year. The Club has also given the association an option on property back of the clubhouse as a site for a dormitory and restaurant building. In the absence of a first class hotel, the manufacturers have felt the need of such a building. J. H. T.

NEW BRITAIN, CONN.

JULY 7, 1919.

Although all through the Naugatuck valley, which includes the big factories at Waterbury, Ansonia, Torrington and Seymour, the past month has seen a succession of labor troubles. New Britain has been remarkably free. In fact the only labor trouble that has occurred here this spring has been of a minor nature and that took place within the past three weeks when about fifty molders employed at the P. & F. Corbin division of the American Hardware Corporation went on a strike for increased wages and a few other unimportant concessions. An attempt was made to cripple the American Hardware Corporation foundry business by inducing the molders in another branch to refuse to do any work for the P. & F. Corbin division. This failed, however, and the strike has apparently died a natural death when General Manager Charles Parsons announced that the men would be taken back on their old jobs should they return.

Most of the factories that had been running on short time have increased their working schedule and at the Traut & Hine Manufacturing Company the working schedule has been increased to fifty-five hours per week. Whether the absence of labor troubles here indicates that the working class is satisfied with conditions, or whether it is because they lack organization is not known. However, in this connection it may be significant to note that at the annual convention of the Connecticut Federation of Labor held at Meriden early in June, one of the labor representatives from this city reported that New Britain manufacturers are lined up against the unions to such an extent that they "will not employ union men." At any event, the fact remains that New Britain is certainly an "open" city as far as unions in the skilled industries line are concerned, and thus far the numerous attempts to organize strong unions among the mechanics and other trades have proved absolute failures.

Business seems to be quite good and all the factories are quite busy. This includes the American Hardware Corporation divisions, the North & Judd Manufacturing Company, the Landers, Frary & Clark Company, which is now building an addition to its plant, the Stanley Works and other larger concerns. The Hart & Cooley Company is also busy and has just announced an increase in the capital stock.

For some time past there have been persistent rumors that the General Electric Company of Schenectady, N. Y., was dickering for the purchase of the Trumbull Electric Company of Plainville. On June 27 however, President John H. Trumbull emphatically denied the transfer of the concern after a newspaper had published a supposed account of the transaction. Mr. Trumbull said: "The statement that the Trumbull Electric Manufacturing Company has been sold to the General Electric Company is without foundation. It is true that negotiations have been pending whereby the General Electric Company would take a stock interest in the Trumbull Electric Company. Such interest, however, does not contemplate any changes in the present management or policies of the Trumbull Company. This company will continue to operate under the same officers and associates, and continue its business policies as in the past." H. R. J.

HARTFORD, CONN.

JULY 7, 1919.

Ethelbert Stewart, director of the inspection and investigation service of the department of labor, has recently based

figures on the probable labor emigration on account of harder working conditions, poor housing, unattractive social life, and some on account of the prohibition, the only apparent inducement being the high wages offered in this country. It is estimated that Connecticut will lose approximately 40,000 of its workers. In Hartford, the exodus of Greek population during the last few months has been marked.

Notwithstanding a jolt in the New Haven figures by the reduction of the working force of the Martin-Rockwell Company from 880 to 200, unemployment in Connecticut dropped during the last week from 6,775 to 5,475, according to an announcement at the state headquarters of the United States employment service in Connecticut. The decrease of 1,300 in unemployed was shown by reports made to the state headquarters by community labor boards and local employment offices. The estimate of the jobless in Hartford remains at 500, while that in Bridgeport dropped 600 from the preceding week, making a total of 1,200 without work in that city, less than half of the estimated 2,500 in New Haven. Stamford reported 150 out of work; New London, 175; Norwich, 700, and Middletown, 250.

A continued shortage of 200 workers in the New Britain-Bristol district was reported, together with reports of equal conditions of supply and demand in Torrington, Willimantic, Putnam and Rockville.

The Fuller Brush Company is planning the erection of a three-story factory building on Collins street, which will be one of the largest and best-equipped factories in the country for the manufacture of wire brushes. The company has branches in forty cities. The new building will cost $150,000.

The employes of the Underwood Typewriter Company have been informed by a circular letter that the profit-sharing plan which has been in operation since 1916 will be continued. The amount to be distributed at the end of 1919 will be 20 per cent. of the final net surplus of the company for the year, and will be given to those employes who have been with the company for two years prior to January 1, 1920. An employe who left, whether voluntarily or by discharge, before April 1, 1919, will not share in the profits. The distribution, which will be on April 1, 1920, will be made in the common stock of the company, or United States government bonds, or both.

Frederick W. Nettleton, who has been snperintendent of the Bristol Brass Company for more than a year, resigned June 24. He will be succeeded by John F. Wade at present works manager of the concern. Mr. Nettleton went to Bristol from Waterbury, where he was superintendent of the Waterbury Clock Company. He has not fully decided what his future plans will be. Mr. Wade, the new superintendent, has been with the corporation for several years, and he was previously with the New Departure Manufacturing Company of Bristol. W. A. L.

WORCESTER, MASS.

JULY 7, 1919.

The biggest happening in an industrial line in Worcester for a long time, and particularly to metal men, was the merging this month of the Wright Wire Company and Morgan Spring Company, both of Worcester, and the Clinton Wire Cloth Company, of Clinton and Boston, into the Clinton-Wright Wire Company, headquarters of which are to be in Worcester.

The new corporation has been incorporated under Massachusetts laws with a capital stock of $12,500,000. The combine gives to Worcester the largest independent single wire interest and largest consumer of wire rods in New England aside from the American Steel & Wire Company.

Six plants are included in the merger—those of the Wright company, at Worcester and Palmer; the Morgan Spring Company and its two subsidiaries; the National Manufacturing Company and the Miller Wire Cloth Company, both of Worcester, and the plant of the Clinton Wire Cloth Company at Clinton.

Hon. George M. Wright, of Worcester, former mayor, who has been president and general manager of the Wright Wire Company, has been made chairman of the board of directors of the new company, and other officers are: President and general manager—Evan F. Jones, treasurer and general manager of the Morgan Spring Company; vice-president and general sales manager—John A. Denholm, vice-president and general sales manager of the Wright Wire Company; vice-president and general manager—George F. Wright, assistant general manager and director in the Wright Wire Company. Members of the board of directors are: George M. Wright, Evan F. Jones, John A. Denholm, George F. Wright, George F. Naphen, of New York, of Liggett & Drexel, members of the New York Stock Exchange, who put through the merger; President Frank A. Drury of the Merchants' National Bank; Paul B. Morgan, president and treasurer of the Morgan Construction Company, president of the Morgan Spring Company and the Heald Machine Company, all of Worcester, and Charles F. Fairbanks, of Lexington, president and treasurer of the Clinton Wire Cloth Company.

All assets of the three companies included in the combine, paid for in cash, have been assumed by the new corporation. There has been paid in $1,500,000 as additional working capital. This money is to be used to make extensions to the big Wright plant at Palmer.

Another merger of importance during the same week was that of the Norton Company and the Norton Grinding Company. Announcement of this combine and the dropping of the Grinding company name was made at a sales conference of the Norton Company at its Greendale plant. The Norton Company manufactured grinding wheels and the Norton Grinding Company grinding machinery.

Professor George I. Alden, president of the Norton Company and Norton Grinding Company, was succeeded by treasurer and general manager Charles L. Allen, July 1. Mr. Alden will remain with the company, however, as chairman of the board of directors.

The Norton Company is a $3,000,000 corporation and the Norton Grinding Company was incorporated for $408,000. Aldus C. Higgins, who has been secretary and general counsel for the Norton Company, is to be made treasurer and general counsel, and George N. Jeppson, who has been works manager, is to be both works manager and secretary. Two new offices of vice-president have been created, one to be filled by William LaCosta Neilson, of Leicester, England, who is to continue as foreign manager. Herbert Duckworth, who has been assistant sales manager of the Norton Company, becomes sales manager of the grinding wheel department, and Howard W. Dunbar, who has been assistant chief engineer in the Norton Grinding Company, becomes sales manager of the grinding wheel department.

Clayton O. Smith, sales manager of the Norton Grinding Company, becomes consulting sales engineer. Charles H. Norton, chief engineer of the Norton Grinding Company, is to continue as chief engineer of the grinding wheel department, and John C. Spence, many years superintendent of the grinding company, is to be works manager of the grinding machine department. Alderman Ross C. Purdy, who has been consulting engineer, is to leave the concern in Worcester and open an office in Buffalo. He will also do work for the Norton Company.

The announcement has been made that the Norton Company has acquired the Hiroshima Grinding Wheel Company at Hiroshima, Japan, and that it will probably abandon its grinding wheel plant at Wesseling, Germany, which has been under control of the Germans during the war, and since the signing of the armistice under control of the English.

There has been no settlement as yet in the molders' strike in this city which has been on now for about two and one-half months. Seven hundred molders are out. Employers have brought equity proceedings in Superior Court against the striking molders' union which request the court to order the strikers restrained from "picketing" and from "interfering in their business." The case was referred to the court to an auditor, and it is believed that it will be several weeks before any report is ready. In the meantime, and because of verbal agreements between the strikers and the employers, only four pickets are on duty at a time in front of the different foundries. The companies appearing as plaintiffs in the equity cases are the Holyoke Machine Company, Reed-Prentice Company and Whitcomb & Blaisdell Company. Many of the strikers have left Worcester to get work elsewhere. W. J. B.

PROVIDENCE, R. I.

JULY 7, 1919.

New orders are pouring in on many of the metal industries of Rhode Island faster than the manufacturers, as a rule, care to see them under existing circumstances. Some of the concerns complain about the scarcity of certain kinds of raw materials as well as the handicap that continues to confront them through the exigencies of the labor situation. The shortage of skilled labor is being felt keenly at the present time among the metal trades, especially among the jewelry lines.

Manufacturers of jewelry and allied lines are using every means they can devise in an effort to secure skilled help. The newspapers are filled with advertisements for help both male and female, skilled or unskilled. The majority of the plants including all of the larger ones in the jewelry industry are now working on the 48-hour weekly schedule and this shorter work week is handicapping the factories in the filling of orders.

Receipts of large orders that ordinarily would be placed in August have helped to further disrupt the delivery schedule of the jewelry manufacturers. Buyers already are coming into the market to place orders for jewelry to be sold next fall and winter, but these early buyers are receiving no encouragement when they ask for early deliveries. Factories in Providence and the Attleboros are far behind on their shipments, due to the shortage of efficient workers.

The Phillipsdale plant of the Gorham Manufacturing Company, used by that concern in its munitions work for the United States Government during the Great World War, has been sold to Otto V. Kean, of Providence. He has made the purchase for the Mechanical Equipment and Chemical Corporation, a new company recently organized and incorporated under the laws of Rhode Island. Mr. Kean was formerly manager of the munitions department of the Gorham Manufacturing Company. The Phillipsdale plant consists of some twenty or more one-story wooden buildings situated on several acres of land on Pawtucket avenue, in East Providence, at the line into Pawtucket. At this plant the Gorham Company filled hand grenades with high explosives during the war, the plant being in operation both day and night for more than a year.

A few days ago announcement was made of the awarding of contracts for additions and improvements at the plant of the Brown & Sharpe Manufacturing Company, on Promenade street, that will increase the present floor space nearly 135,000 square feet and which will cost approximately $400,000. This includes additions that are to be erected to three of the buildings now constituting the plant, and excavations have already been commenced.

Business at the plant of the Standard Nut and Bolt Company, Valley Falls, has taken a change for the better, during the past few weeks and the prospects for a still further boom in business seems favorable to the officials of the plant. The concern is operating on a 55-hour schedule weekly, and with a full complement of help.

The Paye & Baker Manufacturing Company, at North Attleboro, is building an addition to its plant on Richards avenue. The success of the concern in the manufacture of surgical instruments has made it necessary for the firm to materially increase its floor space.

Joseph Bernier, box 64, Chartley, Mass., and Julian Bellevance, box 64, of Barrowsville, Mass., have filed a statement with the city clerk of Providence that they are the proprietors of the J. Bernier Engraving and Electro-plating Company, 67½ Clifford street.

W. H. M.

ROME, N. Y.

JULY 7, 1919.

Just as the belief was gaining ground that conditions in the metal industry field in this city were assuming a normal after-war status, as was indicated in the correspondence from Rome in the June issue of THE METAL INDUSTRY, this city was plunged into almost complete idleness, in so far as metal workers are concerned, by a series of strikes and walkouts at the various plants located here.

The action of the workers has resulted in practically closing the plants of the Rome Brass & Copper Company, Rome Manufacturing Company and Locomotive Works; Rome Wire Company, Rome Metal Mill, Rome Hollow Wire & Tube Company, and the James A. Spargo Wire Company.

The strikes took place in the early part of June, and, at this writing, are still unsettled, neither employes nor employers showing any sign of compromising their position.

The demands of the workers, it is understood, include both an increase in wages and an eight-hour day, with time and a half for overtime. However, the manufacturers, thus far, have refused to grant the demands of the men and the shops are practically at a standstill, as far as production is concerned.

The situation has not been marked by any unusual acts of violence or disorder, and the police authorities have been given but little trouble. About 4,000 shop employes, it is claimed, are on strike.

Mediators and conciliators from Albany and Washington have been in Rome and have had conferences with the men and manufacturers with a view to bringing both parties to agreement, but without success.

Many of the skilled workers have left the city to take employment in other manufacturing centers, where the demand for men seems to be greater than the supply.—M. J. D.

ROCHESTER, N. Y.

JULY 7, 1919.

With a demand never before equalled in the industrial history of the city, the manufacturers of Rochester are actually facing a shortage in many lines of skilled labor. Added to this rather extraordinary condition is the fact that shipping facilities, both by freight and express, are slow and more or less unsatisfactory. Now that the war is over, and practically has been since November, railroad accommodations should be much more advantageous to the manufacturer. The early months of the year gave promise, but that feeling was displaced in April and the situation has not improved much since.

The shipping situation is not a pleasant one to contemplate. It applies to supplies en route to Rochester as well as the outgoing movement of manufactured products. The entire problem does not speak well for governmental control of railroads and express companies.

In many of the larger manufacturing institutions, such as the Eastman Kodak Company, Bausch & Lomb Optical Company, General Railway Signal Company, and several of the stamping companies it is stated that there is a pronounced shortage of skilled help, not only among mechanics but in the offices. Such a tremendous demand has been made on Rochester manufacturers, that despite the fact that almost every soldier who wanted his old job back got it on his return, there is still a demand for certain high-grade men.

Labor was never in better shape in Rochester insofar as wages are concerned. Nearly all of the trades are organized, and few strikes have occurred. At present the only trouble that disturbs the industrial horizon is the moulders' strike, and that is a sort of state-wide affair. It is thought that the moulders and their employers will eventually compromise the matter. Pressure to attain that end is being brought by prominent business interests.

The passing of the saloon and the dawn of Prohibition is believed by many manufacturers to mark a new era in industrial development. It certainly will tend to increase the productive output of thousands of workingmen, but at the same time the "common labor" market will be oversupplied because of the hordes of brewery employes that will be dumped upon the street. Most of these men have but one line of occupation—that of plain unskilled labor. The chemists, machinists, clerks, and office help will quickly adapt themselves to new conditions. With the others, time alone will tell.

The copper market in this city is very strong under a heavy demand. Brass of all kinds is strong and firmly held. There have been two sharp advances in the wholesale price of both brass sheets and rods in recent months, and another advance is expected. Market for aluminum is firm and prices unchanged. The big demand, of course, is due to the auto-

mobile industry, which employs much aluminum in the making of bodies. Lead is quiet; spelter has shown little change in the past month, although the demand is much larger.

The Eastman Kodak Company is erecting a large building in the rear of the old State street camera plant, facing Platt street. It will be seven stories high, one story taller than the main works. All of the State street offices will be transferred to the new structure.

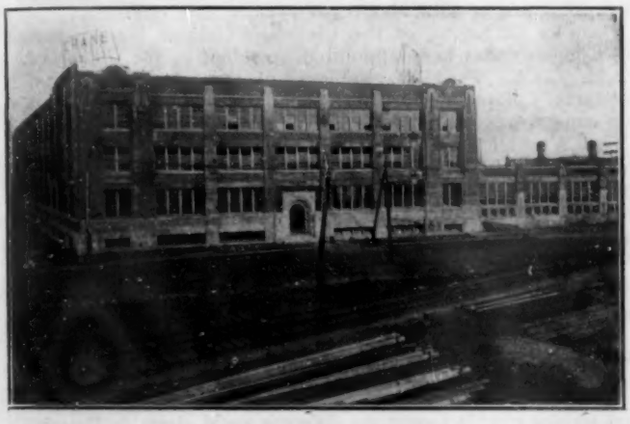
The Eells Stockless Anchor Company, of New York, has purchased forty-two acres of land in the suburbs and will erect a large manufacturing plant thereon at once. The concern makes other metal materials in addition to anchors, and requires a great deal of brass and copper. Several hundred men will be employed in the new plant. The Erie Mop and Wringer Company, established in Erie, Pa., in 1882, has obtained a manufacturing site here, and will erect a factory. The concern uses much tin, copper and brass. G. B. E.

MONTREAL, CANADA

JULY 7, 1919

Business in the metal line has shown a decided improvement this month, the first that has occurred this year, as everything has been very dull since January.

The signing of the Peace Treaty will be the means of stabilizing business here, and the indications point to a good fall trade. Labor conditions have been adjusted at the local brass manufacturing plants, and they are now running with their normal force of employees.



THE NEW PLANT OF THE CRANE COMPANY AT MONTREAL, CANADA.

A new magnesium alloy has been put on the market by the Shawingan Electro Metals Company this month and it is expected to play an important part in the manufacture of piston rods for automobiles and aeroplanes. A large foreign shipment was made to Italy this month comprising different pieces for experimental and test purposes.

There have been changes in the tariff this month which work out a protection of $20 a ton on lead, one cent a pound on zinc and 1¼ cents on copper alloys, which an ad valorem of 15 per cent, on the semi-finished product.

Those interested in the metal industry of the Pacific provinces have long been urging something to stimulate production, and it is believed that this tariff will have that effect.

The ships of the Canadian Government Mercantile Marine are beginning to go into commission, and headquarters have been opened here in Montreal. Six vessels have already been delivered. Thirty more are scheduled for delivery during the year, and the remaining before the close of 1920.

The amount of copper and brass that enters into the construction of these vessels is quite an item. The cost of the ships, when completed, has been calculated to cost $52,000,000 or over that figure.

Building operations have improved considerable this month, and the demand for plumbing brass goods is increasing in volume.

The firm of Cuthbert & Cohen, Duke street, who specialize in plumbing brass goods, are doing a very nice business on this line of goods and general brass work at present. P. W. B.

PITTSBURGH, PA.

JULY 7, 1919.

Business continues good in the metal industry lines in the Pittsburgh district and a spirit of optimism is apparent on all sides. Mills and foundries continue to get busier due to an increased number of orders and the presence of returned overseas men who are fast finding their old places in the mills and factories. The past few days finds the building trades about satisfied with the new agreements with local contractors and are fast returning to work. This strike, affecting in all about 6,000 craftsmen including composition roofers, lathers, sheet metal workers, carpenters and others, has been in progress during the entire month of June and a wage settlement with these men is heartily welcomed by all firms and individuals engaged in the construction world. With a resumption in the building business now at hand it is expected that business in all lines will pick up. Some few firms are reporting a slight dull period during June because of this being the period of the year when railroads and mills, who run their business on the semi-yearly basis take stock. Orders are coming in good with prices remaining firm in some lines and advancing in others. The majority, not only in the metal industries field but many others, look to the near future to bring bigger orders with plenty of work for all concerned. Reorganizations of some firms with increases in capitalization taking place in others is a sure sign that business isn't going to stand still but is on the upward trend.

The Basic Mineral Company, on North Side, with Cassius M. Miller general manager, is contemplating extensive improvements and extensions to their present plant and will expend in the neighborhood of $25,000. The new additions will include storerooms, a laboratory and mills and the installation of an electric furnace. The structure will be of fire proof construction, two stories, high. The portion occupied by offices will be nicely painted and decorated and will be up to date and modern in every respect.

The Damascus Bronze Company report business very good with conditions continually getting better.

The representative of the METAL INDUSTRY had occasion to visit the works of the Hanlon-Gregory Company plant a few days ago and found things running full capacity, with the floor and warehouse containing much finished product ready for shipment. This concern does galvanizing.

The Lava Crucible Company, with offices in the Jenkins Arcade, are undergoing a reorganization and will soon be in a position to turn out crucibles in larger quantities.

The Aluminum Company of America, with main offices in the Oliver Building, find business good. Several new extruded shapes and automobile mouldings have been turned out during the past month. J. A. C.

COLUMBUS, OHIO

JULY 7, 1919.

The metal market in Columbus and central Ohio territory is more active than was the case a month ago. Marked activity in all metals has developed and the slump appears to be a thing of the past. Prices have advanced on the average of one to two cents per pound and the trend is distinctly upward.

All metals have shared in the upward movement. This included brass, copper, aluminum, spelter, tin, zinc and type metals. Most of the orders are for immediate delivery as reserve stocks are now pretty well used up. Very few of the orders are for deferred delivery and there is no disposition to stock up for the future. Present needs contribute entirely to the better tone in the market. One of the best features is the demand for all type metals which is especially strong. Stocks of that sort of metal are low and many of the users are trying to accumulate some supply.

Conditions as to labor among the metal concerns of Columbus are generally good. No strikes of consequence have been called and labor is generally satisfied with present conditions. Wages are high, of course, and no effort has been made to reduce them. Only a part of the former employes are employed, but the proportion is considerably over 65 per

cent, and is probably about 75 per cent of the number employed during war times.

The Aluminum Fixture Company of Cleveland has been chartered with a capital of $25,000 by Fletcher E. Turrell, H. Lindale Smith, C. A. Mutton, F. H. Townsend and R. Kornfeld.

The Metals Welding Company of Cleveland has been chartered with a capital of $200,000 by Frank H. Ginn, W. B. Cockley, James P. Wood, W. T. Kinder and King Tolles.

The Lake Erie Metal Products Company of Cleveland, Ohio, has been incorporated with a capital of $20,000 by John P. Kalma, James G. Strand, Jennie Strand, Frank J. Andel and Frances Harris.

The Toledo Enamel Wire Products Company has been chartered with a capital of $14,000 by Jerome Ackerman, Seymour Hirsch, George H. Beckwith, L. W. Wickenden and L. Van Luven. J. W. L.

CINCINNATI, OHIO

JULY 7, 1919.

There has been a slight softening of prices within the past ten days in the pig iron market, but brass and copper have been steady. The last increases noted in the prices on brass and copper was on June 12th, when copper was increased 1½ cents per pound and brass one cent per pound. Since that time the prices have been stationary. The demand for both these metals continues strong. Local members of the trade anticipate a busy summer, many of them booking large orders. At least, they say, they do not look for any sensational changes in the market during the summer. It is quite possible, they believe, that the prices may increase again during July and August, but they do not look for any large increases.

Trade is only fair with manufacturers of machine tools and only moderate inquiry. In certain lines of hardware wholesalers report a good business. Plumbing houses are being rushed with orders, owing to the increase in building activities.

Brass materials are to be manufactured by the John Douglas Company, plumbers' supplies manufacturers, in a new addition to be built adjoining their present plant.

Members of the firm of Kemper Brothers, San Francisco, Cal., are about to establish connections with a local firm for the manufacture of metal specialties which they are desirous of placing on the market.

The Metal Manufacturers' Group of the Cincinnati Chamber of Commerce was organized at a recent meeting with a roster of 20 members. Colonel Charles F. Hake, Jr., was elected head of the new organization.—H. C. L.

CLEVELAND, OHIO

JULY 7, 1919.

Settlement early in June of all disputes between organized labor and building trades employers, and this includes settlements with other factions remotely connected with the building industry, has brought almost revolutionary changes in the metal industry during the last few weeks. Principal demand for material has come from the building trades, which are overcrowded with housing and other construction, although most of it still is housing. The contrast in operations today compared with even a month ago are so marked that to say that building, in housing at least, has increased 50 per cent during the period is putting it conservatively. The most significant settlement in wage and hour disputes has been made between employers and foundry men in copper and brass plants, these obtaining a 50 per cent wage increase and an eight-hour day. Arbitration boards have settled the disputes in nearly every instance. In few cases have workers obtained all of their demands, but the compromise is satisfactory to both sides. The chief factor that now confronts metal industrial plants is how to get the material and how to turn out the finished product fast enough to meet the building requirements. Incidentally, the large automobile and allied interests of Cleveland particularly, but of the Middle West generally, are calling for finished parts, that they may speed their production, and meet the enormous demand for automobiles. From this it will be gathered that the industry as a whole is upon an eve of prosperity undreamed of even during actual war time conditions.

Another factor that has had a stimulating effect upon every line of business has been the assurance of a definite peace. Many plants in the industry began speculating on new equipment for their different departments as soon as the Germans indicated in the slightest degree that they would be like the baseball player—who holds off until the last minute and then signs up, just as everybody knew he would. The effect upon the machinery branch of the business has been equally stimulating.

Further expansion locally is announced by Charles E. Thompson, president of the Steel Products Company, which firm has taken over the land and factory buildings of the Parker Rust Proof Company of America at Detroit, Mich. Operations of the Michigan plant under the direction of the Cleveland firm will start September 1. The production at the Cleveland plant will be continued as in the past.

H. E. Allyne, president of the Aluminum Castings Company, has been elected vice-president of a new company formed here to promote airplane travel between Detroit and Cleveland. Actual transportation of passengers, and perhaps freight, is expected to start before the summer is over.

H. M. Buluckian, metallurgical chemist, of Cleveland, has applied for patents covering a process of hardening aluminum, which, he says, will make the metal available for uses to which iron now is put. The process, in addition to this feature, is simple and inexpensive, he says. Tests he has made, declares Mr. Buluckian, have gone up to 340,000 pounds to the square inch. Mr. Buluckian's headquarters at present are at 4512 McGregor avenue, this city.

Franklin G. Smith, of the Cleveland-Osborn Manufacturing Company, has been appointed president of the Cleveland Y. M. C. A. Fred W. Ramsey, of the Cleveland Metal Products Company, has been appointed vice-president of the same organization.

The Wheeler Radiator and Manufacturing Company has purchased land in the East Cleveland section, where it proposes to erect a new factory building. Members of the firm formerly were identified with the English and Mersick Company, New Haven, Conn. Both are making automobile parts, such as radiators, wind shields and similar hardware.—C. C. C.

DETROIT, MICH.

JULY 7, 1919.

Attempts of various kinds have been made by agitators to start serious trouble among the different metal plants in Detroit, but in no instance have they been able to cause any embarrassment. In fact, it can hardly be said that a real strike has taken place here. The Wadsworth Manufacturing Company, which produces automobile parts, has just passed through the most trying labor dispute of any concern here, but it is understood difficulties have been settled and all trouble is over.

No strikes have occurred in any of the great automobile plants and none are expected, as the highest wages are paid and working conditions are reported good. The demand for labor, both skilled and unskilled, is so strong and wages are so good in these plants that manufacturers, as a rule, do not anticipate any serious trouble from the paid foreign agitator.

There is, however, a condition gradually approaching that is not generally discussed among manufacturers, though in the minds of a great many must be a factor for serious consideration sooner or later. There is no getting around the fact that an army of foreign laborers are planning to leave Detroit for their native lands. A large number already have started for their far-away homes in Europe, notwithstanding the fact that the war has made that part of the country so unfavorable for residence. Such an exodus as now threatens Detroit and every other industrial city cannot help but become a serious industrial condition in the no distant future. It simply means continued high wages and continued high prices for every manufactured commodity affected by labor conditions.

The Mutual Electric and Machine Company has become the owner of the large plant building at Fourth and Porter streets here which will give this concern a floor space of 100,000

square feet. This company manufactures electric switches and electrical controlling and distributing apparatus. This company also controls by patents, the manufacture of metal parts by the "cold flowed" process, a method of working metal which was invented by H. J. L. Frank, the company's president.

It is announced that the Crescent Engraving Company of this city has purchased the Baker-Vawter electroplate and engraving plant at Benton Harbor, Mich. This plant now will be devoted to work of the general trade and will be improved by much new equipment which will increase its capacity more than 100 per cent.

The Grand Rapids Brass Company has just filed articles of incorporation with a capitalization of $50,000, half of which has been paid in.

LOUISVILLE, KY.

JULY 7, 1919

While business is not exactly rushing with the majority of the copper workers of Louisville, there is a very fair demand as a whole, and the general report is that business could be much worse, and is better than had been expected. Considering the fact that for many years Louisville coppersmiths did two-thirds of their business with brewers and distillers the loss of this business has been anything but an easy blow. There hasn't been a lick of direct distillery work for two years, and brewery work has been light.

It is reported that a good deal of work is in sight in connection with remodeling some of the old distilleries and breweries into syrup plants for manufacturing soft drinks and small alcohol percentage beers. One of the large cooperage concerns has recently installed a keg department in answer to a demand for syrup kegs, with indications that syrup manufacturing will become a big thing.

Manufacturing milk machinery has kept one or two concerns busy, and there is still some Government work being handled. There is a very fair demand for special castings of one kind or another, as machine shops are managing to keep fairly busy as a whole. Business in Louisville has been generally good, this being shown by general reports, such as Dun's, Bradstreet's and the Louisville Clearing House.

The labor situation in Louisville is fairly good, the local metal workers managing to keep fair forces, and having no trouble with their men. However, labor is generally disturbed. The telephone companies went on strike on July 1, while the bakers and printers have been out for several days, and the clothing manufacturers have been having trouble for weeks. The death of John Barleycorn released several hundred workers locally, and men returning from the army and navy, and released from Government work are sufficient to fill all demands. However, there is no surplus supply reported locally.

The Vendome Copper & Brass Company has plenty of work on hand to carry it through the summer according to E. E. Sherman, head of the concern. This house is erecting five plants for soap manufacturers, who use distilling equipment in handling glycerine. Most of this work is on heavy copper of 5/16 to ½ inch, and is in Kentucky, Illinois, Ohio and Indiana.

E. E. Sherman, of the Vendome Copper & Brass Works, has applied for a patent on a new auto carburetor of his own invention, which will feed water through the carburetor in such a manner that the water is turned into steam, reducing carbon trouble, and greatly increasing mileage on gasoline. He expects to manufacture and market the invention.

The Independent Brass Works, of Louisville, is keeping very busy on small casting orders, and still has some excellent orders for castings on Government work for the C. Lee Cook Company, of Louisville. Manager Rademaker expects to be busy all season.

Ahlers & Gregoire are not rushed but have enough business on hand to keep the shop going at a very fair clip. Most of the company's work is of a general nature.

Matt Corcoran & Company are still working on copper tube work for the navy and expect to be busy for several weeks before this work is completed.

Hines & Ritchey are doing very little in the brass and casting departments at this time, having turned over almost the entire shop to its milk machinery department, operated as the Standard Milk Machinery Company.

Gus Kleinsteuber and Joe Young have formed the firm of Kleinsteuber & Young, which is doing general sheet metal work. The concern has opened offices with the Vendome Copper & Brass Works.

Carl Stege, 40 years of age, who for several years was with the late Christian Stege, in the E. A. Stege Mfg. Co., later the Stege-Rindt Plating Co., and now the Stege Brass & Plating Works, recently died of neuritis at his home in Louisville. Mr. Stege was well known for many years in the brass and plating business. He is survived by five brothers and four sisters.—O. V. N. S.

PHILADELPHIA, PA.

JULY 7, 1919.

Labor conditions in the metal industries of Philadelphia are satisfactory, except in those plants located very near to the large shipyards. The managements of some of these places find difficulty in holding reliable labor in face of the high wages paid by the ship builders under the scale of the Shipping Board.

The local United States Employment Bureau reports that the majority of metal working shops of the city are able to get a fair supply of labor sufficient to carry on the moderate amount of business now on hand. Taken as a whole group, the metal industries here are not over rushed, although more business is said to be in sight, and following the signing of the peace treaty a boom is expected to develop in many lines that have been rather dull for some months. With the coming of this boom a labor shortage is predicted by many business men.

Many of the ship yards and larger manufacturing plants of the district are advertising steadily for all kinds of labor. Common laborers are especially scarce in the ship yards, and the supply of skilled mechanics, especially coppersmiths, is short.

There is no lack of employment anywhere for capable workers in any line. The employment bureau has no trouble in placing any man except some of that class of "war mechanics" who, in the rush of war, were advanced from common laborers to piece-workers or to jobs paying full-fledged mechanics' wages. These men are now unable to hold good jobs in peace-time industries and are unwilling to go back to the laborers' jobs they held before the war.

No strikes or labor troubles of any consequence have occurred recently. Philadelphia has the reputation of being a city of amicable relations between employer and employes, and although it has probably a larger percentage of skilled mechanics in its population than any other large American city, it has had very few labor troubles in its history.

Wages paid in privately managed plants here are not quite so high as those paid in the metal industries of middle western cities, according to employment officials. The housing problem is becoming more acute and is likely to have an unsettling effect on Philadelphia labor. Such great numbers of working men have had their rents raised excessively or have been compelled to buy houses at inflated valuations that the cost of living problem has been intensified.

One of the pioneers, in this city, in establishing industrial democracy and a profit-sharing system that insures satisfactory labor conditions is the Miller Lock Company, one of the largest metal industries of its kind in the country. Over 46 per cent of this company's profits are paid to employes in dividends, according to a recent official report. The employes participate in this amount according to the length of employment of each and his value to the company as measured by his monthly earnings Each share is based on the number of locks produced in th entire plant.

The labor dividends are paid every month to the employes who have been in service at least three months. This profit-sharing plan is said to be very successful from the standpoints of both the management and the workers. The company also provides education and training for its workers, factory representation, and life insurance. Handicapped men, and especially blind men, have been employed with success, not only in production and earning capacity, but in improving the "morale" of

the entire factory. These "sons of the dark" are so happy in their work that the normal workers have come to realize that discontent on their part had poor excuse.

The Philadpelphia Navy Yard, which was thrown open to the public on June 28 for the first time since our entry into the war, is one of the largest employers of metal workers in the country. Since April, 1917, $25,000,000 has been spent there and the expenditure of many more millions is provided for or proposed. It is the largest naval station in the country. It has the only complete naval aircraft factory in existence. It cost with machine tool equipment $6,150,000, and has produced up to date 187 flying planes, valued at $4,500,000. G. B. G.

TRENTON, N. J.

JULY 7, 1919.

There has been little if any change in the metal industries in Trenton during the past few months. Labor seems to be perfectly contented for once and no new demands of any kind have been presented to the concerns for consideration. In years gone by there were always demands for increased wages presented to the firms about the first of May or June. But since the war has resulted in increased wages the workingman appears to be better contented. Manufacturers, it is believed, will not take a chance of reducing wages until the cost of living has been further reduced for fear that it will result in labor trouble. One big Trenton plant instead of reducing wages chopped a few hours each week off every employe and this resulted in less wages being paid. Mechanics are still being well paid, but are earning less since plants ceased making war material, such as ammunition, etc.

The Trenton Emblem Company, manufacturers of bronze, brass and aluminum goods, has removed its plant from 801 Chambers street to 120 Hamilton avenue. The company's business has gradually expanded until the officials decided to seek larger quarters. In the new building the company will have 3,000 square feet of space. The concern is reported to be very busy at the present time on new work.

The John A. Roebling's Sons Company, Trenton, N. J., has awarded contracts for additions to cost $12,800.

The last New Jersey legislature passed a bill appropriating $25,000 for the purchase of bronze medals for the New Jersey soldiers who fought in the world war. The contract for the medals has not yet been let. The manufacture of the medals will give metal workers work for some time.

Auto Hardware Company, of Newark, N. J., has been incorporated with $50,000 capital stock to deal in automobile hardware. The incorporators are Henry Reimer and Jacob Wellington, of Newark, and Joseph Fischer, of New York.

H. W. Schrimf & Company, of Perth Amboy, N. J., has been incorporated with $125,000 capital stock to manufacture and deal in metal goods. Henry W. Schrimf and Herbert A. Schrimf, both of Woodbridge, and L. A. Moore, of New York, are the incorporators.

Craig Bouillion Manufacturing Company, of Newark, has been incorporated with $1,000 capital stock to manufacture and deal in metal goods. The incorporators are M. D. Bouillion, of New York, L. A. Newton and R. C. Carson, of Newark.

American Aluminum Ware Company, 314 Jeliff avenue, Newark, N. J., will erect a three story brick stock room and factory, 50x37 feet to cost $14,000.

The Empire Metal and Refining Company recently acquired the property of the Newark Bay Smelting and Refining Company on Plum Point Lane, Newark, and has made improvements at a cost of $10,000. The company will also erect a store room, 45x90 feet at a cost of $8,000.

A. W. Wheaton F Brass Works, 112 Walnut street, Newark, N. J., will erect a two story brick office and storage building, 25x28 feet, to cost $5,500.

Standard Manufacturing Company, of Newark, N. J., has been incorporated with $50,000 capital to manufacture and deal in hardware, etc. The incorporators are H. A. Black, W. J. Hilton and A. F. McCabe, all of Newark.—C. A. L.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

C. A. Goldsmith, Newark, N. J., operating a brass foundry at 270 Thomas street, has filed plans for a one-story pattern shop.

The British Aluminum Company has moved its Canadian office from 60 West Front street, Toronto, Canada, to 265 Adelaide street West.

Chas. H. Kewell Company, 437 Market street, San Francisco, Cal., is contemplating the installation of a small plating plant in the near future.

The American Manganese Bronze Company, Philadelphia, Pa., has filed plans for a one-story addition, 21x65 feet, which will be used as a by-product reclaiming plant.

Bastian Brothers Company, manufacturers of metal novelties, 69-113 Mount Hope avenue, Rochester, N. Y., is considering the erection of an addition for increased production. T. E. Bastian is president.

The distribution of the products of the **American Boron Products Company,** Inc., Reading, Pa., has been taken over by the Baltimore Copper Smelting & Rolling Co., Inc., Baltimore, Md., and New York.

The Continental Bronze Company, 48 Oxford street, Providence, R. I., has filed notice of organization to manufacture bronze goods. John J. Ward and George P. Stoecker, of Pawtucket, R. I., head the company.

The New Jersey Zinc Company, New York, has just established warehouses in San Francisco and Los Angeles, Cal., from which its products will hereafter be distributed to its trade on the Pacific Coast.

The Doehler Die-Casting Employes Association has recently been organized by the employes of the **Doehler Die-Casting Company,** Brooklyn, N. Y. The employes of this company also issue monthly a paper entitled "Doehler Topics."

The Victor Aluminum Company, Wellsville, N. Y., is erecting an addition, 52x100 feet, to its plant to cost $15,000. The departments operated by this company are a tool and grinding room, rolling mill, and spinning, stamping, tinning, soldering and polishing departments.

R. H. Taber, Wallingford, Conn., has arranged for the erection of a new one-story plant on South Cherry street, to be equipped for the production of hollowware and silver and metal products. Mr. Taber operates a tool room, and spinning, stamping, soldering, plating, and polishing departments.

The American Hardware Company, New Britain, Conn., has had plans prepared for a five-story mill building, 50x120 feet. The company has a brass and bronze foundry, brass machine shop, tool and grinding room, casting shop, spinning, stamping, plating, polishing, lacquering and japanning departments.

The estate of the Métals Production Equipment Company, Springfield, Mass., has been sold by the trustee and the plant has been leased from the purchaser by the Baush Machine Tool Company, and the business will be carried on under the name of **Baush Machine Tool Company, Metals Division.**

The National Foundry Company of New York, 10 Sandford street, Brooklyn, N. Y., manufacturers of plumbers' supplies, has purchased 10 acres on Grand street, and will

build a plant to provide about 80,000 square feet of floor space. The company operates a tool and grinding room, casting shop.

Franklin Williams, Inc., 10 Railroad place, Newark, N. J., manufacturer of brass castings, etc., has filed plans for a one and two-story foundry at Oliver and Jefferson streets, 48x151 feet, to cost $20,500. The company now operates a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room and casting shop.

The Peninsular Brass Works, 85 York street, Detroit, Mich., manufacturer of brass products, will build a new plant, one story, covering 20,000 square feet. The company operates a smelting and refining department, brass foundry, brass machine shop, tool and grinding room, casting shop, cutting-up shop and plating and polishing departments.

With the recent incorporation of the **Betson Plastic Fire Brick Company,** Rome, N. Y., Frank J. Jewell was elected president and secretary, and Nelson Adams, vice-president and treasurer. The products of the company are plastic fire brick for furnace linings and Hi-Heat cement for use in boiler rooms.

The Niagara Brass Manufacturing Company, Buffalo, N. Y., has purchased the Holly Company shops at Lockport, N. Y., for a brass and aluminum foundry and machine shop, and to which its Buffalo plant will be moved. The plant consists of approximately 50,000 feet of floor space. Besides a brass and aluminum foundry and machine shop the company operates a casting shop and stamping department.

The Victoria Metal Company, smelters, refiners and founders of brass, bronze, aluminum, etc., Erie, Pa., on June 18 suffered a very heavy loss by fire in its reclamation plant. The entire equipment of that department was destroyed. Plans are under way for the reconstruction of this plant, and equipment for concentration and reclamation work will shortly be purchased.

The Aluminum Ware Manufacturing Company, East Clinton street, Elmira, N. Y., has commenced the construction of an addition, 90x155 feet, with an extension of 86x90 feet. The company is also installing new machinery and equipment to the amount of $75,000, and at the present time operates a tool and grinding room, cutting-up shop, spinning, stamping, galvanizing, tinning, brazing, soldering, plating, polishing, japanning and lacquering departments.

The W. H. Dollar Manufacturing Company, North Front street, Camden, N. J., manufacturer of metal novelties, etc., has commenced the erection of a two-story plant, 52x70 feet, to cost about $20,000. The company operates stamping, galvanizing, tinning, soldering, plating, polishing, japanning and lacquering departments, and is in the market for wire forming machines, sheet metal stamping press, and electroplating equipment.

The published report that the property of the **Roessler and Hasslacher Chemical Company,** New York, with works at Perth Amboy, N. J., and the Perth Amboy Chemical Works, Perth Amboy, were to be sold by Francis P. Garvan, Alien Property Custodian, New York, is incorrect. The company announces that a minority of the shares of the company and not the property will be offered for sale by the Alien Property Custodian on July 10.

The Estey-Trainor Wire Cloth Company, 270 Union avenue, Brooklyn, N. Y., recently incorporated with a capital stock of $10,000, will engage in the manufacture of extra fine mesh wire cloth, hitherto almost exclusively imported from Europe. Special power looms have been developed by the company for this purpose. Wire cloth of brass, copper, phosphor-bronze, nickel and Monel metal will be manufactured. S. Raymond Estey, president, Estey Brothers Company, who has been in the wire cloth and wire work business for the past 23 years, is president; Edward J. Trainor is vice-president; G. Howard Estey, also secretary and treasurer of Estey Brothers Company, is secretary and treasurer.

CHANGE IN FIRM NAME

The gilding and silver plating business formerly conducted under the name of C. Roese & Company at 101 Barrow street, New York, will now be conducted by **C. Roese** at 472 Canal street, New York.

The corporate name of the Basic Products Corporation, Woolworth building, New York, has been changed to **The Theroz Company.** The company was not re-incorporated, and no change has been made in the organization, the change being made in order to identify the corporation with the name adopted for its products.

The Economy Machine Products Company is the name of a corporation, capitalized for $15,000, succeeding the Economy Manufacturing Company, 4755 London avenue, Chicago, Ill., manufacturers of air sprayers, screw machine products, safety set screws and other metal specialties. The change in name has been adopted on account of the increase in business in the lines mentioned above, the new name being more suited to the present line of work. The company has installed new equipment, and their factory is running full force.

INCREASE IN CAPITAL STOCK

The Kauffman Metal Parts Company, Bellefontaine, Ohio, manufacturer of metal machinery, has increased its capital stock to $125,000 and will erect a machine shop, 120 x 120 feet. It will also operate a brass, bronze and aluminum foundry. Plans are being prepared by P. C. Dowell, factory manager.

The Decatur Brass Works, brass founders and finishers, Decatur, Ill., recently increased its capital in order to care for an increase in business. The company has bought a factory in Decatur and they have already started to remodel it and also build a new brass foundry. The company operates a brass, bronze and aluminum foundry, brass machine shop, tool room and stamping, tinning, soldering, plating, polishing and lacquering departments.

The Owosso Bronze Bearing Company, Owosso, Mich., which was only organized last February, has increased its capital from $25,000 to $50,000 and has purchased a factory site at the Junction opposite the Michigan Central Station and work is now under way for the erection of a foundry and machine shop which is to be ready by August 1. Modern foundry and machine equipment will be installed for manufacturing high grade bearings for the automobile, tractor and electrical motor trade.

The Allied Machinery Company of America, New York, has increased its capital stock to $5,000,000. This was made necessary by the decision of the American International Corporation to group all of its machinery export selling subsidiaries under one head. This move contemplates the complete absorption of the Allied Construction Machinery Corporation by the Allied Machinery Company of America. The Allied Machinery Company de France and the Allied Machinery Company d'Italia will retain their corporate entities but their parent corporation will be the Allied Machinery Company of America rather than the American International Corporation as before. This is also true of the Horne Company, Ltd., of Japan, which was purchased early in the year by the American International Corporation. J. W. Hook will continue as president of the allied Machinery Company of America, in general charge of the business. F. A. Monroe, S. T. Henry and T. G. Nee have been elected vice-presidents. Mr. Monroe is in charge of the administrative affairs of the company. Mr. Henry is in charge of sales and advertising and Mr. Nee is at present in Japan devoting

his attention to the affairs of the Horne Company, Ltd. R. P. Redier is general sales manager of the company, with headquarters at Paris.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture brass and aluminum castings—The Foster Brass Foundries, Cedar Rapids, Iowa. Capital $50,000. Incorporators: W. H. Dutton, H. D. Foster and others.

To manufacture propellers, etc.—The Thacher Propeller & Foundry Corporation, Albany, N. Y., has been incorporated with a capital stock of $1,200,000 by H. S. Bell, T. C. and G. H. Thacher.

To manufacture plumbers' brass goods—The Galt Brass Company, Ltd., Galt, Ont. Capital $500,000. Incorporators: Arthur W. Holmsted, Albert R. Kinnear, Arthur B. Mortimer and others.

To manufacture brass and other castings. The York Hardware & Brass Works, York, Pa. Capital $25,000. Incorporators: J. Elmer, E. D. and R. F. Workman, of York, Pa., and George S. MacIntosh, Philadelphia, Pa.

To manufacture electric furnaces, reclamation plants, foundry machinery, etc.—The Universal Electric Furnace Company, 1520 Fidelity building, Baltimore, Md. Capital $20,000. Incorporators: Raymond M. Glacken, Frederick E. Fisher and Robert E. Kanode.

To manufacture metal products—The Canso Manufacturing Company, New York. Capital $25,000. Incorporators: L. Pollak, B. Schnee and D. M. Pompan, 53 Jay street, New York. The company operates a brass machine shop, tool grinding room, cutting-up shop, plating and lacquering department.

To manufacture plumbers' brass goods—Royal Brass Company, Cleveland, Ohio. Capital, $35,000. Incorporators: Lee C. Kinslea, P. E. Hutchinson, Joseph A. Schlitz, B. M. Barker and M. E. Ordner. The company will operate a brass foun-
plating and polishing departments.
dry, brass machine shop, grinding room, casting shop and

To manufacture metal specialties and art goods—The Smith Metal Arts Company, Buffalo, N. Y. Capital $100,000. Incorporators: Frederick C. Smith, C. F. Damm, and A. H. Jamieson. The company is establishing a factory at Niagara street and Massachusetts avenue, and will operate the following departments: Spinning, stamping, brazing, soldering, polishing, plating and lacquering.

To manufacture disc grinding machinery and equipment—The Badger Tool Company, Beloit, Wis. Capital $75,000. Incorporators: E. B. Gardner, president; C. E. Cadman, vice-president; H. I. Kelley, secretary, and R. D. Gardner, treasurer. E. B. Cadman was formerly secretary of the Gardner Machine Company, Beloit, Wis., while R. D. Gardner was formerly advertising manager, and C. E. Cadman and H. I. Kelley held the respective positions of chief draftsman and auditor with the same company.

AMERICANS FORM COMPANY TO CONTROL WORLD SILVER MARKET

An attempt will be made by American silver producers to wrest the control of silver from Great Britain, and with this end in view plans are being worked out for the formation of a silver export company under the provisions of the Webb bill which permits American manufacturers to combine for foreign trade. The new company will probably be formed along the same lines as the Copper Export Association, which was organized shortly after the signing of the armistice.

Three of the largest silver producers in this country are behind this movement, namely, the Anaconda Copper Mining Company, the American Smelting & Refining Company and the United States Smelting & Refining Company.

A little more than 50 per cent. of the world's supply of silver is produced in this country, yet for about thirty years the price has been regulated in London, the values which ruled the world's markets being fixed by a committee of three called the "Silver Triumvirate."

GOVERNMENT SUPPLIES OF CUPRO-NICKEL

The War Department, through the Director of Sales, is making inquiries designed to develop a market other than that afforded by the United States Mint, for approximately 75 carloads of cupro-nickel, the material from which the five-cent piece is coined. This material was acquired by the War Department to be used in the making of metal jackets that encased the 0.30 caliber bullets and other small arms ammunition. The alloy obtained for military purposes has a slightly higher copper content than that used for coinage. It consists of 85 per cent of copper and 15 per cent of nickel. The cupro-nickel is stronger than brass, and notwithstanding the presence of copper in its composition takes and maintains through long usage a natural nickel finish. Experiments have demonstrated that this alloy has an advantage over nickel-plated brass in that it holds its nickel finish. Therefore the office of Director of Sales, says an announcement of the War Department, is calling the attention of the manufacturers of automobile accessories, cutlery, builders' hardware, jewelry, pipe fittings and other nickel-plated commodities, and inviting suggestions from them as to new uses to which the metal may be put. The present surplus of cupro-nickel held by the War Department consists of the following quantities: 68 tons cupro-nickel bars (for rolling or for casting), 598 tons cupro-nickel sheets (from which the jackets are extruded); 805 tons cupro-nickel sheets in coils; 623 tons partly finished bullet jackets; 356 tons cupro-nickel scrap resulting from operations; 10 tons finished jackets.

The sheets and coils are adaptable for use by stamping mills. The bars, partly finished jackets and finished jackets are suitable for casting.

A. P. MUNNING & CO'S OUTING

The 1919 sales convention of A. P. Munning & Co., manufacturers of electro-plating and buffing apparatus and supplies, was held at the factory at Matawan, N. J., June 26 to 28. The entire sales force, the officers of the company, and the heads of departments, participated in the conferences. Among those who led in the discussions were A. P. Munning, president; H. L. Zucker, vice-president; Floyd T. Taylor, general manager; T. C. O'Brien, purchasing agent; W. F. Hall; Frank Toole; F. J. Clark; T. Lamoureux; G. E. Hopkins, of Cutter & Wood Supply Co., Boston; P. H. Bergin; H. A. Todd; C. G. Backus; F. H. Bliss; F. X. Burke; Guy S. Warren and F. S. Bruen.

An entertainment on Thursday evening, a supper and factory dance at Seidler's Beach on Friday evening and the annual banquet on Saturday evening were among the social features of the gathering. Visits to nearby seaside resorts were enjoyed on Sunday, and on Monday many of those in attendance left for Philadelphia, to attend the annual convention of the American Electro-Platers Society.

PRINTED MATTER

Ventilators—The Merchants & Evans Company, Philadelphia, Pa., has just issued a very interesting folder entitled "Star Ventilators." This folder contains complete description and various illustrations showing the installation of the Star ventilators in industrial as well as office buildings.

Reamers—Wetmore Expanding Reamers is the subject of Bulletin No. 11, recently published by the Wetmore Reamer Company, of Milwaukee, Wis. This publication includes illustrations, descriptions, dimensions and prices of Wetmore reamers, their parts, arbors, blades, etc.

Safe Practices—The National Safety Council, 208 La Salle street, Chicago, Ill., has issued bulletins Nos. 19, 20, 21, 22, 23 and 24. These bulletins are devoted respectively to "Exits, Fire Alarms and Fire Drills," "Woodworking Machinery and Equipment," "Accident Records, How to Compile Them and How to Use Them," "Shop Lighting," "Gas and Electric Welding" and "Fire Extinguishment." The bulletins are all fully illustrated.

Bronzes—The American Manganese Bronze Company, Holmesburg, Philadelphia, Pa., has just issued a very interesting catalog entitled "Bronze Products of Quality for Engineering Purposes." This catalog contains descriptive matter and illustrations of hydraulic castings, gear wheels, propellers, ingots, valves, bronze forgings, bearings and bushings, rods, rolls and shapes and also tables showing physical properties of the bronzes manufactured by this company. Copies of the catalog will be sent upon request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL STOCKS MARKET QUOTATIONS

	Par.	Bid.	Asked.
Aluminum Company of America.....	$100	$500	$600
American Brass	100	225	230
American Hardware Corp.....	100	153	156
Bristol Brass	25	34	36
International Silver, com.....	100	30	32
International Silver, pfd.....	100	92	96
New Jersey Zinc.....	100	250	255
Rome Brass & Copper.....	100	280	330
Scovill Mfg. Co.....	100	410	430
Yale & Towne Mfg. Co.....	...	245	260

Corrected by J. K. Rice, Jr., & Co., 26 Wall street, New York.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

JULY 7, 1919.

COPPER.

Activity and rising prices in the copper industry last month added strength to the growing confidence apparent in all metals trade. Total sales approximated 150,000,000 pounds on domestic and foreign account, the domestic buying being largely for July—August shipments; producers being reserved on last quarter positions for which buying interests are entering inquiries. A few such orders, however, were placed at ½ to ¾c premium over the August price. The advance in prices during the month was 2 to 2.50c per pound on the different kinds of metal; prime Lake closed at 19c for July and at 19.25c for August. Electrolytic, for which the demand was heaviest, closed at 18.50c for spot and 18.75c for August. Casting copper was not so actively purchased and closed at 17.87½c to 18c for July and August positions, respectively. These prices range 4 to 4.50c higher than the lowest points touched this year. Producers sales during the first half of the year are estimated to have been approximately 700,000,000 pounds.

Statistically considered, the only disturbing feature was in the fact that importations in June closely approximated if they did not exceed, exports—complete figures are not yet available. Production of crude copper continued to decline, being estimated at 95,000,000 pounds during the month. The decrease during first six months as compared with the corresponding period last year is estimated between 40 and 45 percent. Total exports for first half of year are estimated to have been 96,000 tons, as compared with 180,000 tons in same period 1918 when the war demand was at its height. An interesting feature is that exports now carry a large proportion of manufactured products, wire, sheets, tubes, rods, etc., whereas previously, exports were largely made up of ingots, bars and cakes.

TIN

The tin market during the first two weeks of June was quiet but expectant, at unchanged prices, 72.50c for Straits, the Government price, 71.25c in the outside market; pure American tin being held at 72c. On June 16 official announcement was made that a balance of only 577 gross tons of pig tin remained of Inter-Allied allocations and that Government restrictions would be removed as soon as the metal was disposed of. On June 23, the metal having been sold, trading in this country between consumers on the one hand and dealers, jobbers and smelters on the other became allowable, the market becoming an open one. Straits immediately declined to 70c New York for spot, the level at which American pure was held and American 99% was offered at 68c, these prices prevailing at the close of the month. Licenses for importations are still necessary, but it is believed that only a short time must elapse before the ban will be lifted. Permits were being freely granted at the close for entry into the United States on Aug. 1. Prices for Eng. L. & F. tin being 51.12½ to 51.25c for July shipments. Straits, for July—August shipment from the East Indies was quoted at 51.25c, a decline of 1.50c per pound over the previous week's figures.

LEAD

The June market for lead opened firm but with little activity at 5.00c East St. Louis, 5.25c New York as the basis of the leading interest while the outside market was quoted 10 points lower, receding still further in the next few days to 5.15c New York. y the 11th, the optimistic tone prevailing, and some small buying brought about an advance in both markets to 5.15c East St. Louis, 5.40c New York, these figures remaining unchanged when the month closed. In the outside market a premium of 7½ points over prompt prices was asked for August shipment, there having been a considerable volume of prompt business transacted. Large inquiries for August shipment were, however, met with reserve by producers. The net advance for the month amounted to 15 points.

ZINC

The market opened with a 2 point decline in prices to 6.15c East St. Louis, 6.50c New York for prompt prime Western, these being the lowest figures of the month. Improvement was noted in the second week and with increasing confidence was continued while a considerable volume of business was transacted on both foreign and domestic account. Prices steadily advanced to 6.62½c East St. Louis, 6.97½c New York, but with some cessation in buying after June 11, there was a gradual decline of 7½ points during the following week. With renewed activity, this loss was quickly recovered and a further advance was made to 7.05c East St. Louis, 7.40c New York on June 26. A falling off in demand in the next few days caused a fractional decline, the net advance for the month being 85 points, the market closing at 7.00c East St. Louis, 7.35c New York, the highest level since last January.

ALUMINUM

The aluminum market continued active and strong in June with prices unchanged at 32-33c for virgin ingots 98-99%; at 29-31c for remelted 98-99%, and at 25-27c for No. 12 remelted. Mills reported capacity operations sold to October, and were refusing orders because of inability to make earlier deliveries. A new feature of interest was the report that the Aluminum Company of America was accepting clippings

in part payment in exchange for ingots, with their price for No. 12 remelted fixed at 31c, although the outside market price was still quoted at 27c per pound.

ANTIMONY

Prices of antimony remained firm and unchanged throughout June from the May closing, 8.37½c duty paid wholesale, and 8.50c for jobbing lots; there being a fair volume of business transacted from week-to-week. A slight falling off in demand was noted in the last week. Shipments from the Orient which were held at 7.75c early in June were advanced to the New York parity by the end of the month. Mining operations are reported to have been practically suspended in the Far East because of unprofitable prices prevailing.

SILVER

The price of silver in June advanced from $1.09⅜ at the beginning of the month to the highest price—$1.12½c on June 18, after which by fractional declines from day-to-day there was a recession to $1.08¼c on June 28. Of great importance and interest is the project now under consideration for the formation of a Silver Exchange and Export Association in the United States. In view of the fact that 80 percent of our silver transactions are with foreign countries and that 70 percent of world production centers in this country, it seems probable that such an organization would be of great advantage in combating foreign buying combinations united for the purpose of controlling prices.

QUICKSILVER

A further advance of $3.00 per flask of 75 pounds to $95 occurred in June with the demand increasing. The most interesting feature was the new tariff bill imposing a duty of 35c per pound, introduced in the House by the Senator from Massachusetts and which was referred to the Committee of Ways and Means.

PLATINUM

Increasing demand, decreasing supply and advancing prices in the platinum market made the June record of conditions an interesting one. By the middle of the month the price had advanced $2.50 per ounce to $107.50, after which no change occurred. Government stocks (about 1,900 ounces) valued at $2,000,000 will be distributed by order of the War Department among eight of the largest dealers to be disposed of. Acute world scarcity of platinum was precipitated by the collapse of the Siberian supply during the war, Siberia having long been the heaviest producer of the metal. Developments in Colombian fields under new ownership and management is rapidly progressing and it is believed will add largely to production during the coming year. A press despatch from Washington notes that Government stocks of platinum will be sold at $105. per ounce and iridium at $200. per ounce. Minimum sale to one person 10 ounces and maximum sale 1,000 ounces.

OLD METALS

Prosperity and activity in the old metals trade in June was represented in steadily advancing prices and increasing business that was characterized as a "boom" by some in the trade. Every item in the list moved up; the coppers from 1¾c on light copper and 2c on strictly crucibled and on uncrucibled wire to 13c on the first, and to 16c and 15.50c respectively on the other two. No. 1 turnings and scrap advanced 1c to 13c and to 14.50c each. No. 1 pewter was up 5c to 40c, and block tin pipe up 3c to 58c. The aluminums were in very heavy demand, old cast rising to 21.50c and old sheet to 22c per pound. The smallest advance was ⅛c on electrotype to 4.87½c. Heavy lead advanced ¼c to 4.75c, while stereotype and light brass were each ½c higher, the former to 5.50c and the latter to 7.75c.

WATERBURY AVERAGE

Lake Copper. Average for 1918, 24.75. 1919—January, 23.00. February, 18.00. March, 15.50. April, 15.50. May, 16.37½. June, 17.75.

Brass Mill Zinc. Average for 1918, 9,858. 1919—January, 9.00. February, 8.20. March, 8.00. April, 6.90. May, 6.80. June, 7.25.

JUNE MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
Copper—			
Lake	19.25	16.75	17.929
Electrolytic	18.75	16.37½	17.655
Casting	18.25	16.00	17.173
Tin	72.00	70.00	71.194
Lead	5.45	5.15	5.329
Zinc (brass special)	7.15	6.20	6.654
Antimony	8.375	8.375	8.375
Aluminum	33.00	32.00	32.833
Quicksilver (per flask)	$95.00	$92.00	$93.143
Silver (cts. per oz.)	112½	108¼	110.440

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. page.

Metal Prices, July 7, 1919

NEW METALS

	Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.	
Manufactured 5 per centum.	
Electrolytic, carload lots	19¾-20
Lake, carload lots	20 -20¼
Casting, carload lots	19 -19⅜
TIN—Duty Free.	
Straits or Australian, carload lots	70½
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	5.40
ZINC.—Duty 15%.	
Brass Special	7¾
Prime Western, carload lots	7.50
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	...
100-lb. f. o. b. factory	...
Ton lots, f. o. b. factory	33.00
ANTIMONY—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	8⅛-8½
NICKEL—Duty Ingot, 10%. Sheet, strip and wire, 20% ad valorem.	
Ingot	40c.
Shot	43c.
ELECTROLYTIC	45c.
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)	$1.90
BISMUTH—Duty free	nominal $3.10
CADMIUM—Duty free	nominal $1.40
CHROMIUM METAL—Duty free	nominal
COBALT—97% pure	$2.50
QUICKSILVER—Duty 10% per flask of 75 pounds	$1.07
PLATINUM—Duty free, per ounce	$105.00
SILVER—Government assay—Duty free, per ounce	$1.07⅜
GOLD—Duty free, per ounce	$20.67